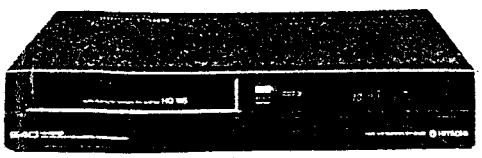
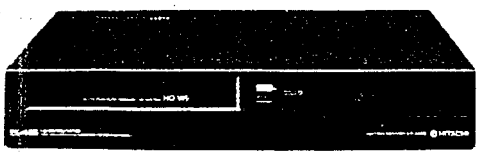
HITACHI
SERVICE MANUAL

TK | **No. 2759E**

VT-540E(CT)
VT-545E/546E(VPS)



VT-540E



VT-545E

Technical Data

tel. 58-79-78

SPECIFICATIONS

Format:	VHS PAL Standard
Recording:	Rotary Two-Head Helical Scan Azimuth Recording
Tape Speed:	23.39 mm/sec. — SP/11.70 mm/sec. — LP
Tape Width:	12.7 mm
Operation Temperature:	5°C to 40°C
Video:	PAL colour (system B & G) & CCIR monochrome signals 625 lines
Recording Time:	480 min. (using E-240 cassette) — LP mode 240 min. (using E-240 cassette) — SP mode
Aerial Input:	VHF channels 2 — 12 VHF channels U1 — U5 CATV channels S1 — S20 HYPER S21 — S41 UHF channels 21 — 69
RF Output:	UHF channel 37 (30 — 39 adjustable) (System G)
Video Input:	0.5 to 1.5Vp-p 75 ohm Unbalanced
Video Output:	1Vp-p 75 ohm Unbalanced
S/N Ratio (Video):	More than 43 dB
Horizontal Resolution:	Colour 260 lines
Audio	
Input:	−3.8 dBm 50 Kohm
Output:	−3.8 dBm 1 Kohm
S/N Ratio:	43 dB
Frequency Range:	70 Hz to 12 kHz
Power:	AC 220V 50 Hz
Power Consumption:	31W (including timer) — VT-545E(VPS)/546E(VPS) 30W (including timer) — VT-540E(CT)
Timer:	24-hour digital indication
Cabinet Size:	435 mm(W) x 81 mm(H) x 336 mm(D)
Weight:	Approx. 6.4 kg
Accessories Included:	1 — Aerial cable 1 — Infrared remote control unit 2 — Programme sheets 2 — Batteries

* Design and specifications are subject to change without notice.

Note : As this model uses the F.S tuning system, see the item of the F.S tuning when servicing the unit.

DESTINATION	TUNING
CT	F.S
VPS	F.S

VHS
THIS VIDEO DECK IS A VHS TYPE VIDEO RECORDER.
FOR PROPER OPERATION, ONLY THE VHS TYPE CASSETTE MUST BE USED.

Manuals related to the VT- 540E(CT)/545E/546E(VPS)

Name of Manual	Language	Manual No.	Chapters Included
Technical Data	English	2759E	Chapter 1-6
	Deutsch	2865G	Kapitel 1-6
Technical Information	English	2775E	–
	Deutsch	2866G	–

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

June 1988 **TOKAI WORKS**

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CHAPTER 1

LIST OF DIFFERENCES

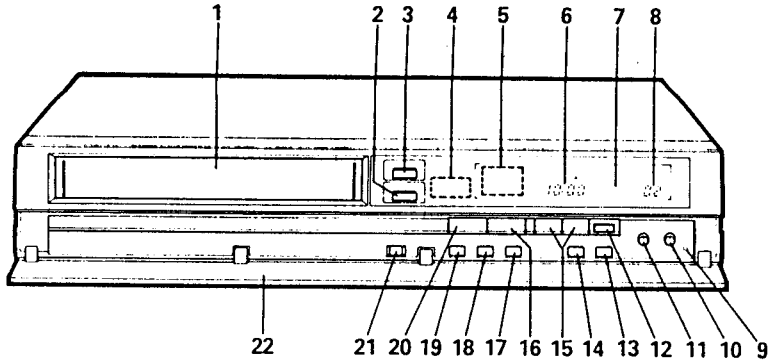
	ITEM	VT-54×E(CT)(VPS)	VT-53×E(CT)(VPS)	VT-42×E(CT)(VPS)
FEATURES	HQ (HIGH QUALITY)	USED	USED	USED
	TRICK PLAY	O VISUAL SEARCH O PAUSE O F. ADV (by Remote Control) O REPEAT (by Remote Control) O INDEX (by Remote Control) O SLOW O LP REC/PLAY	O VISUAL SEARCH O PAUSE O F. ADV (by Remote Control) O REPEAT (by Remote Control) O INDEX (by Remote Control) O SLOW	O VISUAL SEARCH O PAUSE O F. ADV (by Remote Control) O REPEAT (by Remote Control) O INDEX (by Remote Control) O SLOW
	AUTO ENDLESS PLAY	YES	YES	YES
	NOISE LOCK SEARCH FUNCTION	YES	YES	YES
	REMOTE CONTROL (LCD TIMER)	WIRELESS (CLOCK TIME DISPLAY)	WIRELESS (CLOCK TIME DISPLAY)	WIRELESS (CLOCK TIME DISPLAY)
	TIMER RECORDING PROGRAMMES	8 PROGRAMMES/ 1 YEAR	8 PROGRAMMES/ 1 YEAR	8 PROGRAMMES/1 YEAR
	TIMER BACKUP POWER	ABOUT 30 MINUTES	ABOUT 30 MINUTES	ABOUT 15 MINUTES
	ON SCREEN DISPLAY	USED	USED	NOT USED
	IRT	CAN SET START TIME AND LENGTH	CAN SET START TIME AND LENGTH	CAN SET START TIME AND LENGTH
	CHANNEL TUNING FUNCTION	FREQUENCY SYNTHESIZER (AUTO TUNING)	FREQUENCY SYNTHESIZER (AUTO TUNING)	FREQUENCY SYNTHESIZER (AUTO TUNING)
	ONE-BUTTON RECORDING	YES	YES	YES
	HEADPHONE JACK	NO	NO	NO
	TRACKING	DIGITAL	DIGITAL	NORMAL
	SLOW TRACKING	YES (by Remote Control)	YES (by Remote Control)	YES (by Remote Control)

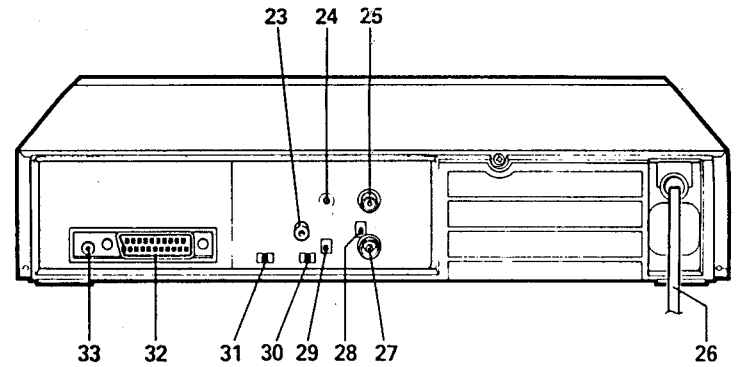
	ITEM		VT-54×E(CT)(VPS)	VT-53×E(CT)(VPS)	VT-42×E(CT)(VP
CHASSIS	BASIC CHASSIS TYPE		ZA	ZA	ZA
	CYLINDER MOTOR		THREE-PHASE OUTER ROTOR FG : 300Hz	THREE-PHASE OUTER ROTOR FG : 300Hz	THREE-PHASE OUT ROTOR FG : 300Hz
	VIDEO HEADS		4 HEADS LP CH-1 / CH-2 : 48μm SP CH-1 / CH-2 : 30μm CONNECTOR TYPE	3 HEADS CH-1 / CH-2 : 65μm CH-3 : 65μm CONNECTOR TYPE	3 HEADS CH-1 / CH-2 : 65μm CH-3 : 65μm CONNECTOR TYPE
MAIN CONTROL ICs	VIDEO SYSTEM	Y-SIGNAL PROCESSOR	HT4907P (IC201)	HT4907C (IC201)	HT4847F (IC201)
		CHROMA SIGNAL PROCESSOR	HES8454C (IC301)	HES8454C (IC301)	HT4809 (IC301)
		Y. VERT. PROCESSOR	—	—	HT4848B (IC202)
		COMB. FILTER	—	—	HES8020A (IC204)
		CCD 1H DELAY	MSM6965 (IC202)	MSM6965 (IC202)	HT4664A (IC203)
	AUDIO SYSTEM	REC / PB AMP	LA7295 (IC401)	LA7295 (IC401)	BA7751ALS (IC402)
	JACK	AUDIO INPUT SELECT	M5201L (IC2503)	M5201L (IC2503)	M5201L (IC1502)
		VIDEO INPUT SELECT	NJM2248 (IC1502)	NJM2248 (IC1502)	LA7016 (IC1501)
	SERVO SYSTEM	SPEED / PHASE CONTROL	HD49726 (IC601)	HD49726 (IC601)	HD49716NT (IC601)
		CYLINDER MOTOR DRIVE	HA13403V (IC603)	HA13403V (IC603)	HA13403V (IC603)
		CAPSTAN MOTOR DRIVE	SA2006A (IC01)	SA2006A (IC01)	M54680FP (IC1601)
		TRICKPLAY CONTROL	M54874P (IC602)	M54874P (IC602)	M54874P (IC602)
	SYSTEM CONTROL	SYSTEM CONTROL μP	HD614088SC50 (IC901)	HD614088SC50 (IC901)	HD614088SB44 (IC901)
		LOADING MOTOR DRIVE	BA6209U4 (IC902)	BA6209U4 (IC902)	BA6209 (IC902)
		VISS CONTROL	—	—	HES8026A (IC905)
	TIMER	TIMER μP	M50957-662SP (IC701)	M50957-662SP (IC701)	M50954-672SP (IC701)
	CH-TUNING SYSTEM	BAND SELECTER	μPC1484CA (IC801) F.S	μPC1484CA (IC801) F.S	μPC1484CA (IC801) F.S
		CHANNEL MEMORY	CXK1013P (IC702)	CXK1013P (IC702)	M58630P (IC702)
	POWER SUPPLY	MULTI REGULATOR	STK5372H (IC851)	STK5372H (IC851)	STK5372H (IC851)
		5V REGULATOR	—	—	—

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safery-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram and circuit board diagram.
2. Before returning repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without danger of electrical shock.

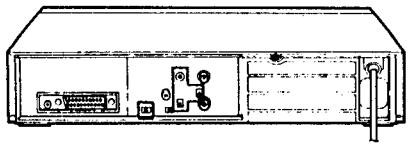




1. **Cassette compartment**
   Insert a cassette through the door, and loading will be completed automatically.
   Note: Power is turned on automatically when a cassette is loaded.
2. **EJECT button**
   Press to remove the cassette.
3. **OPERATE switch**
   Turn the system power on and off.
4. **Infrared ray receiving section**
   Receives infrared rays from the remote control unit.
5. **Mode indicators**
   - "[oo]" appears when a cassette is in the compartment.
   - "PLAY" appears during the playback mode.
   - "REC" appears during the record mode.
   - "◁◁" appears during the rewind mode and flashes during the rewind visual search mode.
   - "▷▷" appears during the fast forward mode and flashes during the forward visual search mode.
   - "▯▯" appears during the play/record pause mode.
   - "⏲" appears when the power is turned off and either the timer has been programmed or IRT is turned on.
   - "INDEX" appears when the index function is on.
   - "LP" appears when the Long Play (LP) tape speed is selected and is off when SP (Standard Play) is selected.
6. **Digital timer display**
   This normally shows the time and day of the week.
7. **Digital date/counter display**
   This shows the current date when the VTR power is turned off or shows the tape counter or tape remaining when the VTR power is turned on.
8. **TV station number display.**
   This shows the TV station number corresponding to the station selected.
9. **Display reset switch**
   Press this switch to reset the display if the digital display malfunctions or no operation mode can be engaged. Set the clock to the correct present time.
10. **Vertical sync. adjustment control**
    If you see vertical shaking on the TV screen in the still playback mode, rotate this control to minimize shaking.
11. **PICTURE control**
    Adjust the picture so it is easy to see.
12. **REC button**
    Press the REC button once to start recording.
    Pressing again lets you select a recording time within 4 hours. After recording for the preset time, the VTR will automatically shut off. This is convenient when you go out during recording.
13. **IRT START button**
    Use this together with the REC button for simplified timer recording. The VTR will automatically start recording when the time selected by the IRT START button is reached and continue recording for the time selected by the REC button, then the power will turn off automatically.
14. **RESET/E240 button**
    Press to reset the counter to "0000" or to calculate the tape remaining for an E240 cassette.
15. **TV PRG (programme)/TRACKING buttons**
    Select the TV programmes you wish to view or record by pressing these buttons.
    You can also select the "AU" position* by pressing these buttons to record or watch the programme input via the EURO jack.
    * One TV station position either higher or lower than the range of preset stations.
    These same buttons become TRACKING buttons and minimize noise in the picture when the VTR is playing back a tape.
16. **STOP button**
    The STOP button must be pressed between "RECORD" and any other operation.
17. **STILL/PAUSE button**
    Press to pause during recording.
    Press to view a still picture during playback
    Press again to release.
18. **F.FWD (fast forward) button**
    Press to activate fast forward.
    Press this button during playback and forward playback picture can be viewed at high speed.
19. **REW (rewind) button**
    Press to start rewind.
    Press this button during playback and reverse playback picture can be viewed at high speed.
20. **PLAY button**
    Note: When a cassette (with its erase prevention tab removed) is loaded, playback starts automatically.
21. **PRESET button**
    Press to preset TV stations.
22. **Secondary control door**
23. **A.DUB jack**
    Connect an external audio sources (tape recorder, amplifier, etc.) for audio dubbing.
24. **RF CHANNEL control**
    Turn TSG ON/OFF switch to "ON" and rotate this control to tune correctly to the video channel.
25. **RF OUT socket**
    Connect to TV aerial input.
26. **Mains lead**
27. **AERIAL input socket**
    Connect an external aerial.
28. **Attenuator switch**
    Generally set to the OFF position.
    Set to "ON" when interference occurs in an area with a strong signal.
29. **TSG ON/OFF switch**
    Set to ON and check that the video channel of your TV set is correct. After setting, set this switch to OFF.
30. **EDIT switch**
    Turn this switch on when using this VTR for playback during dubbing. The dubbed tape will provide clearer pictures. This function does not work when using this VTR for recording.
31. **AUTO/COLOUR switch**
    AUTO: Circuits are automatically switched to the colour or black/white mode. Set to this position when playing or recording a PAL signal.
    COLOUR: When recording a PAL signal in an area far from the broadcasting station, the recorded picture may lose colour. In this case, set to this position in recording and playback.
32. **EURO jack**
    For connection to a TV with a EURO or DIN jack using an exclusive cable. See your dealer for details.
33. **PAUSE jack**
    Connect a camera pause cable.

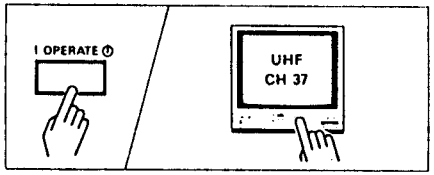
VIDEO CHANNEL SETTING

The RF converter changes the video and audio signals from a previously recorded video tape during playback to the same type of signal used for TV broadcasts. The RF converter output in this unit is pre-set prior to shipment to UHF channel 37.



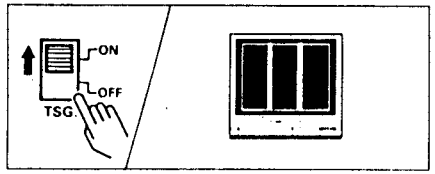
User's controls

1 Turn on VTR and TV, then set TV to UHF channel 37.



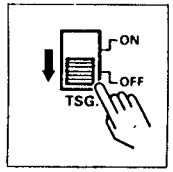
If your TV has a channel button marked "A/V", you can use this channel instead of UHF channel 37.

2 Set the TSG ON/OFF switch to ON.



The test pattern appears on the TV screen.
Fine tune your TV until the test pattern is received clearly.

3 After precise adjustment, set the TSG ON/OFF switch to OFF.

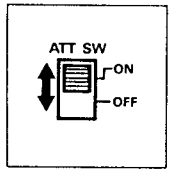


NOTE:
If it is not possible to correctly tune to the test pattern or channel 37 is used for broadcasting in your area, adjust the RF converter output with the RF channel control using a small screwdriver and readjust your TV until the test pattern is observed.

When connecting the VTR to a TV set provided with auto-tuning and the video channel cannot be set, operate as follows:

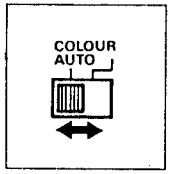
1. Remove the aerial cable from the AERIAL terminal of the VTR.
2. Leave the TSG ON/OFF switch "OFF".
3. Playback a blank tape.
4. Press the PAUSE button to set to the pause mode.
5. Press the Auto-tuning button of the TV.
6. Auto-tuning starts and it stops at UHF channel 37.
   Note: The auto-tuning indicator of the TV set changes to an exact tuning indicator.
7. Set the channel memory of the TV to ON and store the channel which was set in item 6.
8. Set the TSG ON/OFF switch to "ON" and check that the picture appears on the TV screen.
   Now, the video channel of the TV has been set properly.
9. Return the TSG ON/OFF switch to "OFF".
10. Reconnect the aerial cable to the VTR.

ATTENUATOR SWITCH



The Attenuator switch located on the rear panel of the VTR is used to adjust the reception of the signal from the tuner section.
If the wavy lines appear in the picture during the reception of a broadcast from a near-by TV station, it may be that the signal reception is too strong.
In this case, set this switch to ON to attenuate the signal.
Normally leave this switch in the OFF position.

AUTO/COLOUR SWITCH

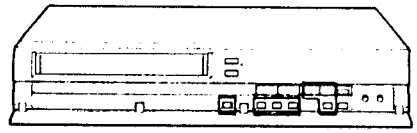


This switch is located on the back of the VTR.
AUTO: Normally leave the switch in this position for reception and playback.
COLOUR: When recording a PAL signal in an area very far from the broadcasting station, the recorded picture may lose colour. In this case, set the switch to this position in recording and playback.

The channel preset by the above procedure is your video channel. You must always select this channel with the channel selector of your TV when playing back a tape or viewing a TV programme selected with the TV PROG button of the VTR.

PRE-TUNING OF BUILT-IN TV TUNER

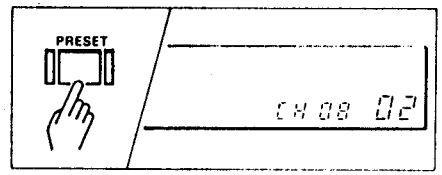
This VTR incorporates a complete television tuner with the required tuning controls. Once you have pre-tuned to preferred stations, you can select any of them by merely pressing the TV PROG button.



User's controls

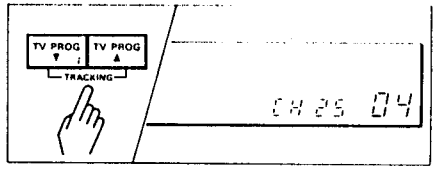
1 Turn on the VTR and the TV, then set the TV to the pre-tuned video channel (described on page 7).

2 Press the PRESET button once.



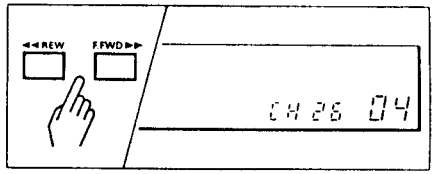
The display indication changes from the clock time display to the band indicator display.
Note: Pressing the button twice will lock the display. If you have pressed it twice, press it once more.

3 Press the TV PROG button on the VTR to select the station number to be memorized.



For example, the above diagram shows that the station number 4 has been selected.
Note: Station numbers "01" through "69" and "AU" can be now selected consecutively by pressing the TV PROG button (either up or down). In this case, you can use any station number.

4 Press and release the REW or F.FWD button (–SEARCH+) to start tuning.

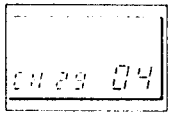


At a station that is broadcasting, the picture appears on the TV screen. If the programme displayed is different from the station to be preset, press the REW or F.FWD button (–SEARCH+) again.
Repeat this until the desired station is reached.

Notes:

- Press the F.FWD (SEARCH+) button; stations are scanned in the order VHF (2 – 12) → UHF (21 – 69) → CATV (S1 – S20) → HYPER BAND (S21 – S41) → VHF (U1 – U5); the colon (:) blinks when scanning CATV and HYPER stations.
- Press the REW (SEARCH –) button; the stations are searched in the reverse order to the above.

VHF (2 – 12) & UHF (21 – 69) Stations Direct Preset



Press the 10 key buttons on the remote control unit instead of step 4 to preset desired VHF and UHF stations.
To preset UHF station 29. In the station number 04, for example, press the TV PROG button to display the station number "04" (in step 3) then press [2] [9] on the remote control unit.

5 Press the STILL/PAUSE (STORE) button when the desired station is reached.
" " will be displayed.

Note: If the TV programme of broadcast by a preset station does not appear clearly, press the REW or F.FWD button (SEARCH+) to fine tune the station. **After fine tuning is completed, press the STILL/PAUSE(STORE) button again.**

6 Follow the same steps as explained in steps 3 through 5 above for other stations.
You can preset up to 69 stations in memory.

7 After having completed tuning to all required stations, press the PRESET button once again.

The stations preset in memory as shown in the above can be selected with the TV PROG buttons on the VTR.

The provided sheet is used to list the stations to which you pre-tune your VTR. List the stations and paste the sheet on the side panel, etc. so as not to hinder you when you operate the VTR.

REMOTE OPERATION

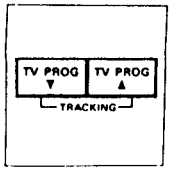
You can operate the VTR from a distance using the

VTR 1/VTR 2 switch

channel with the channel selector of your TV when playing back a tape or viewing a TV programme selected with the TV PROG button of the VTR.

Programme selection

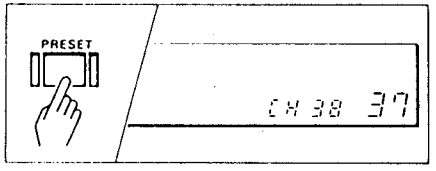
The programme up and down controls on the VTR let you advance directly to the next higher or lower programmed station.



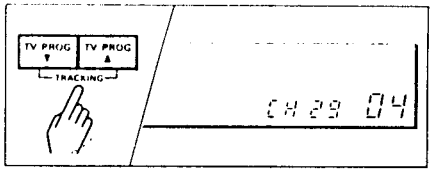
Eliminating unwanted preset stations

You can rearrange the desired stations by eliminating unwanted preset stations for programme up/down tuning.

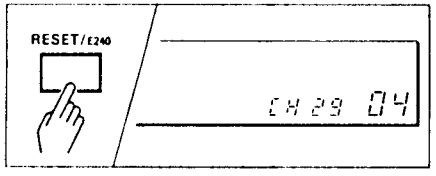
1 Press the PRESET button once.



2 Press the TV PROG buttons until an unwanted station is found.



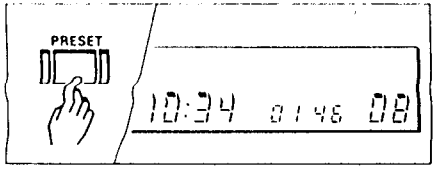
3 Press the RESET/E240 (CLEAR) button once.



Sound will go off indicating the station has been erased from memory.

4 Repeat steps 2 and 3 until all unwanted stations have been erased.

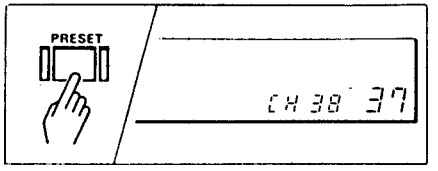
5 After eliminating them, press the PRESET button once again.



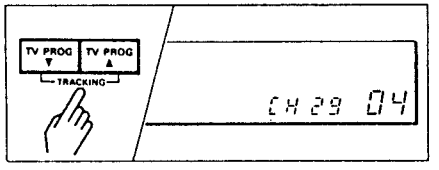
Adding stations

You can preset stations again which have previously been eliminated because they were unwanted.

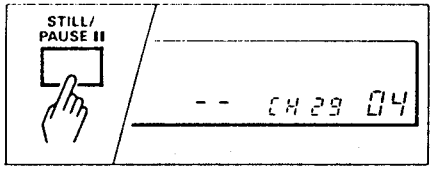
1 Press the PRESET button once.



2 Press the TV PROG buttons until the station which has been previously eliminated and you desire to preset again is found.



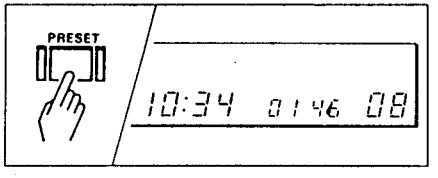
3 Press the STILL/PAUSE (STORE) button.



Sound will come on indicating the station has been added to memory.

4 Repeat steps 2 and 3 for other stations if desired.

5 After adding stations, press the PRESET button again.



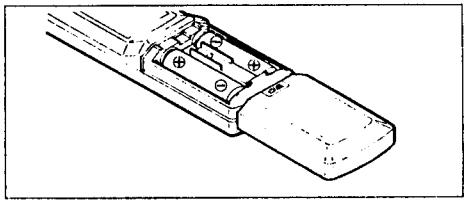
press the REW or F.FWD button (–SEARCH+) again.
Repeat this until the desired station is reached.

REMOTE OPERATION

You can operate the VTR from a distance using the Infrared Remote Control unit which performs the same functions as the corresponding buttons on the VTR.

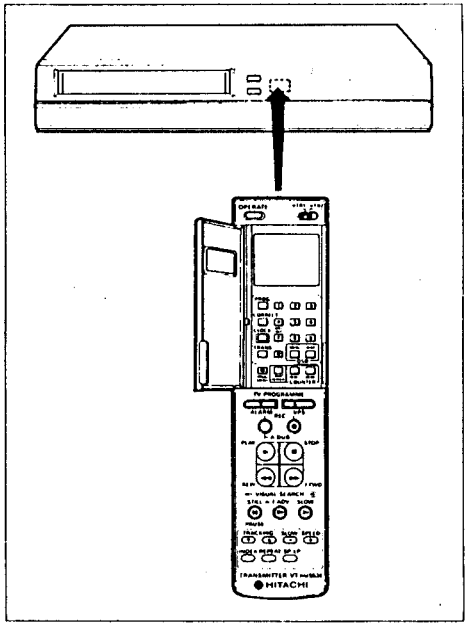
Power source of infrared remote control unit

The infrared remote control unit is powered by two batteries (size IEC standard R6). The life of the batteries is about a year although it depends on the number of times the unit is used. Replace the batteries when operation is not possible or when the distance becomes too small.



Remote operations

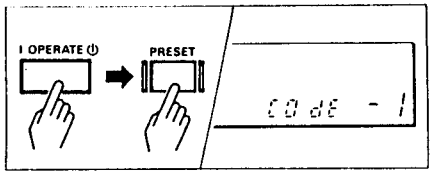
To operate the VTR with the remote control, set the VTR 1/VTR 2 switch on the remote control unit to the VTR 1 position, then point it at the receiver on the front of the VTR.



VTR 1/VTR 2 switch

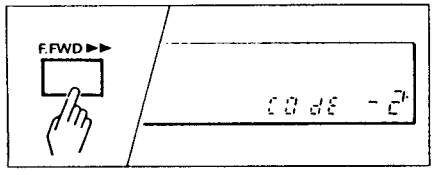
The remote control unit provided can remote control not only this VTR but also other VTRs. For tape dubbing, as an example, recording VTR and playback VTR can be controlled by a single remote control unit. When controlling two VTRs, operate the other VTR as the VTR 1 and this VTR as the VTR 2. However, this VTR has been preset to be controlled as the VTR 1. Therefore, take the following procedure to set this VTR so it can be controlled as the VTR 2.

1 Turn the VTR power off and press the PRESET button located behing the secondary control door.



"CODE - 1" appears in the display.

2 Press the F.FWD button.



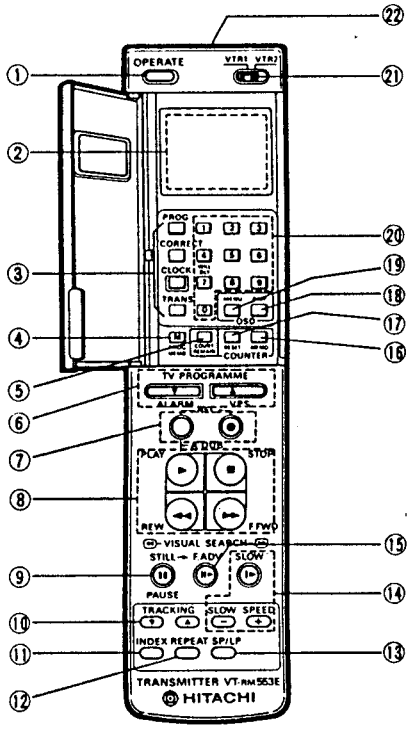
The display switches to "CODE - 2".

3 Press the PRESET button again.

Now, this VTR can be remote controlled as the VTR 2.

Note: To return this VTR so it can be controlled as the VTR 1, use the above procedure again to display "CODE - 1".

Controls and functions



① **OPERATE:** Same as OPERATE on the VTR (turns operate on/off).

② **Clock/time display:** While setting the clock/timer, this display will prompt you through the procedure. After setting the clock, the display shows the clock time.

③ **Clock/timer programme buttons:** See the supplementary manual for complete information.

④ **PROG MEMO:** Press to store the programmed contents in the memory of the remote unit after programming the timer. This can store up to 4 programmes. See the supplementary manual for complete information.

⑤ **COUNT/REMAIN:** Press to switch from a counter display to tape remaining display.

⑥ **TV PROGRAMME:** Same as TV PROG on the VTR. (Selects the next higher or lower TV station.)

⑦ **REC:** Press both buttons to start recording.

⑧ **PLAY/STOP/REW/F.FWD:** Same as on the VTR.

⑨ **STILL/PAUSE:** Same as STILL/PAUSE on the VTR. (Stops the tape temporarily.)

⑩ **TRACKING:** Minimize noise in the picture during playback.

⑪ **INDEX:** Used for INDEX function.

⑫ **REPEAT:** For repeat function.

⑬ **SP/LP:** Select the tape speed for recording. When LP is set,"LP" appears in the OSD and VTR's display. When SP is selected, no indication appears on the VTR's display and "SP" appears in the OSD. The playback speed is automatically set to the speed used in recording.

⑭ **SLOW/SLOW SPEED:** Used for slow motion play.

⑮ **F.ADV:** Advance the picture from frame to frame during still playback.

⑯ **COUNTER MEMO:** Turns counter memory function on and off.

⑰ **COUNTER RESET:** Same as RESET on the VTR. (Resets the tape counter to "0000" or calculates the tape remaining for an E240 cassette.)

⑱ **OSD DISP (display):** Controls the On-Screen Display.

⑲ **OSD MENU:** Controls the On-Screen Display.

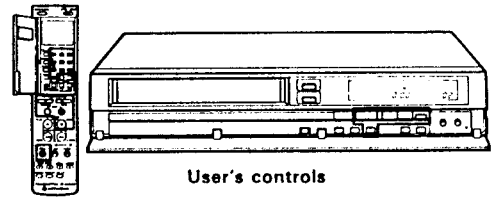
⑳ **10-KEY button**
- Press two numbers to select a TV station.
- Also use for setting the clock and programming the timer.

㉑ **VTR 1/VTR 2:** Select the VTR to be controlled if you are using two VTRs.

㉒ **Transmission window:** Transmits commands to the VTR.

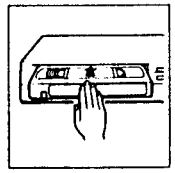
Note: The infrared rays will bounce off the walls and eventually reach the receiver on the VTR, but for best results transmit the rays directly to the receiver.

RECORDING TV PROGRAMMES

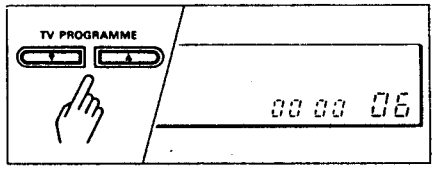


User's controls

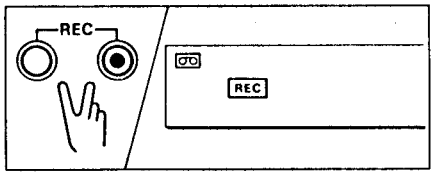
1 Insert a cassette.
Note: Be sure to check that the erase prevention tab is not missing. If it is removed, the VTR is set to playback mode automatically.



2 Select the programme to be recorded by pressing the TV PROGRAMME buttons.

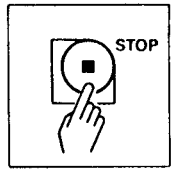


3 Press the REC buttons.



Now, recording starts.

4 After the recording has been made, press the STOP button.

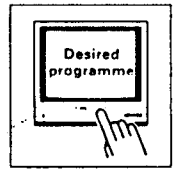


To view a programme while recording it

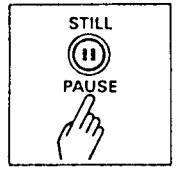
You can view a programme while recording it by merely selecting the video channel (described on page 7) with your TV.

To record one programme while viewing another

You can record one programme while viewing another by merely selecting the programme you want to view on your TV. The recorded programme can be viewed later at your convenience.

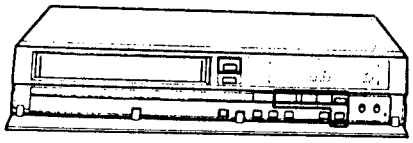


Notes:



1. If you want to avoid recording unwanted material, press the STILL/PAUSE button. Press the STILL/PAUSE button again to release the pause mode. To prevent tape damage, do not leave the unit in the pause mode for more than 5 minutes.
2. If you want to change programmes while in the record mode, press the STILL/PAUSE button then select the desired programme.
   Press the STILL/PAUSE button to release the pause mode.
3. If the cassette in the VTR has its safety tab removed, the VTR will eject it when the REC button is pressed.
4. Your TV does not have to be on to make a recording because the VTR records TV programmes without the aid of your TV. It is only used for monitoring.

INSTANT RECORDING TIMER (IRT)

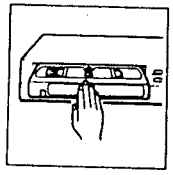


User's controls

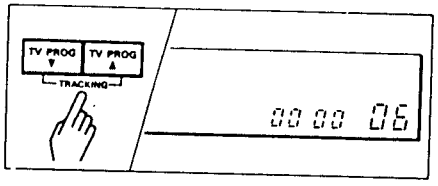
The Instant Recording Timer allows you to make simplified timer recording without using the programme timer. There are two simplified methods, as explained below.
Before using the IRT function, see the supplementary manual for the remote control unit and set the clock correctly.

FOR IMMEDIATE RECORDING

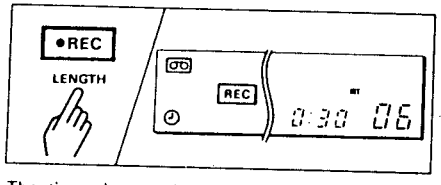
1 Insert the cassette (one with an intact erase prevention tab) into the cassette compartment.



2 Press TV PROG button to select the programme to be recorded.



3 Press the REC/LENGTH button once to start normal recording. Press the button again to indicate the recording time in the display.



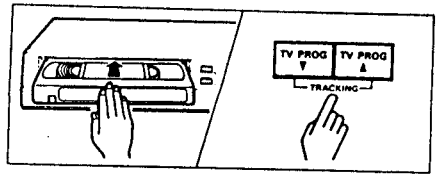
The time changes in the order 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 when the button is pressed several times. During recording, the remaining time is displayed.

4 At the end of recording the display reads 0:00; the VTR will automatically stop.

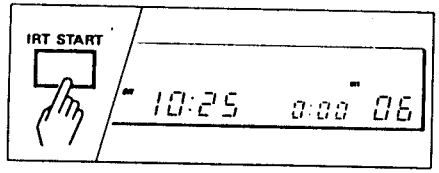
Note: The IRT feature does not operate during play and after a programme timer recording has started.

FOR SIMPLIFIED TIMER RECORDING

1 First perform Steps 1 and 2 of "FOR IMMEDIATE RECORDING".

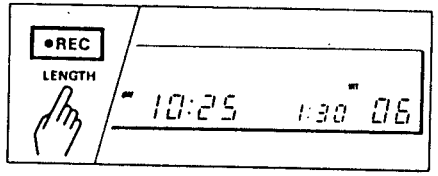


2 Press the IRT START button to select the start time.



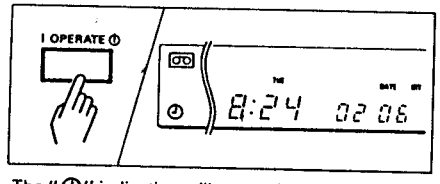
Holding the button down increments the start time in 10-minute steps. Each time it is pressed increments the start time by 1 minute.

3 Press the REC/LENGTH button to set the required recording time.



The time changes in the order 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 when the button is pressed several times.

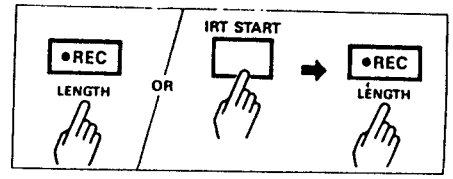
4 Press the OPERATE switch off.



The "🕘" indication will appear in the display. The recording will start at the time selected and will automatically stop when the recording time display reads "0:00".

To extend the recording length

- When the VTR has already started recording, press the REC (LENGTH) button to set the required recording time.
- When the VTR is in the standby mode, press the IRT START button and display an IRT programme in the display, then press the REC (LENGTH) button to set the required recording time.
- The recording length will be set to 0:30, 1:00, 1:30, 2:00, 3:00 or 4:00 as selected.

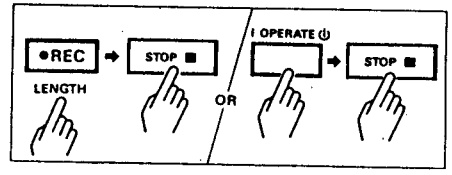


To change an IRT programme

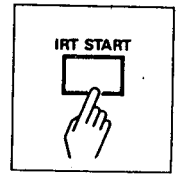
- Perform the above procedure to change the length of the recording.
- The start time cannot be changed. When you have set the wrong start time, clear the programme (see at right) and start IRT programming again.
- To change the station number, turn the power on and press the TV PROG button.

To stop IRT after recording has started

- Press the REC (LENGTH) button until the recording length display changes to the tape counter display, and then IRT recording is released and the VTR continues normal recording. Then press the STOP button to stop recording.
- Or, press the OPERATE switch then the STOP button within ten seconds.



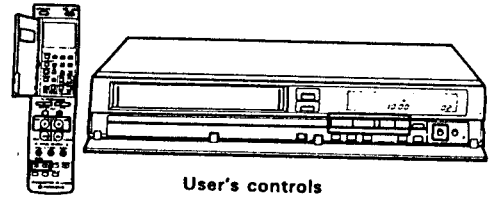
To recall the IRT programme
Press the IRT START button to recall the start time and recording length. In about 8 seconds the display returns to normal.
Note: If the REC (LENGTH) button is pressed when the IRT programme is being recalled, the recording length can be changed.



To cancel IRT programme
Press the IRT START button to recall the IRT programme then press the REC (LENGTH) button as many as required to indicate "0:00" in the display. After approximately 8 seconds, the display will return to the present time of day, and IRT has been cleared.
Note: The OPERATE switch may be on or off.

Note: If IRT and programme timer recording overlap, IRT recording has priority.

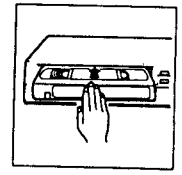
PLAYBACK



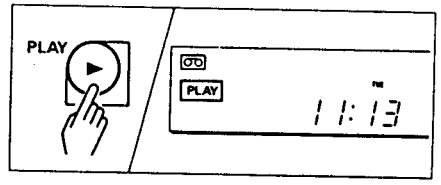
User's controls

1 Turn the TV set on and select the video channel (described on page 7).

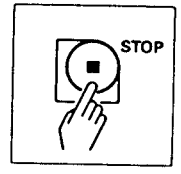
2 Insert the cassette.
Note: When the cassette (with its erase prevention tab removed) is loaded, playback starts automatically.



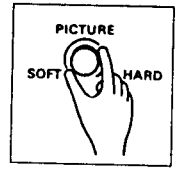
3 Press the PLAY button.



4 Press the STOP button to stop playback.



Picture control adjustment
Adjust to your preferred picture (soft or hard).

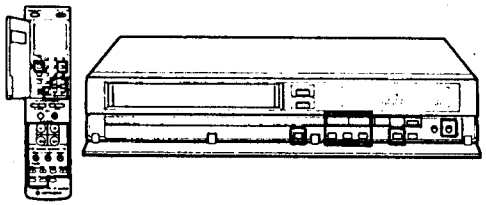


Tracking control adjustment

When playing prerecorded tapes or those recorded on units other than your own, black and white streaks may appear on your TV screen. If this occurs, adjust the TV PROG/TRACKING or TRACKING buttons until the streaks disappear.

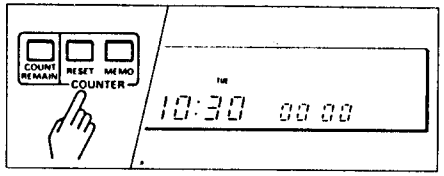
Pressing both buttons at the same time returns the tracking to the normal position.

SPECIAL CHARACTERISTICS



Tape counter

This indicates the amount of video tape transported as a number. Press the COUNT/REMAIN button on the remote control unit to display the tape counter in the display then press the COUNTER RESET button to set the counter reading to "0000" when starting recording or playing back.

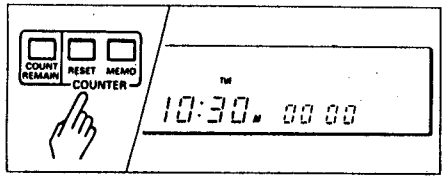


Note the number on the tape counter at the beginning and end of each programme you record. This will allow you to use the counter to find the desired programme later.

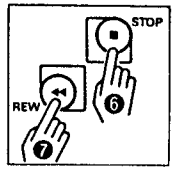
Counter memory function

This is useful if there is a section of tape you want to view immediately after recording or if you want to return to the same point several times.

1. Begin recording or playing back a tape.
2. Press the COUNT/REMAIN button to display the tape counter in the display.
3. At the point where you want playback to begin, reset the tape counter to "0000" by pressing the COUNTER RESET button.
4. Press COUNTER MEMO button, and the "M" appears in the display.



5. Continue to play or record.
6. Press the STOP button when recording or playback finishes.
7. Press the REW button.



The tape will automatically stop at the position where "0000" was preset.

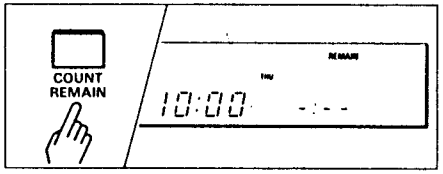
Actually, so that you won't miss the very first part of the programme, the tape will stop slightly prior to "0000", at a reading of approximately "9997".

Note: The counter memory function will also operate in the fast-forwarding mode.

Tape remaining

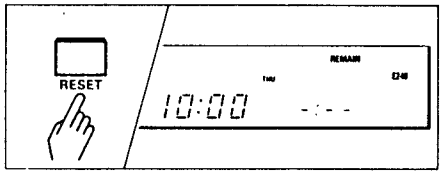
This function allows the time of the remaining tape to be displayed during recording or playback.

1. Press the COUNT/REMAIN button on the remote control unit to display the tape remaining time. The "REMAIN" indicator lights in the display and the counter display is replaced with the tape remaining display.

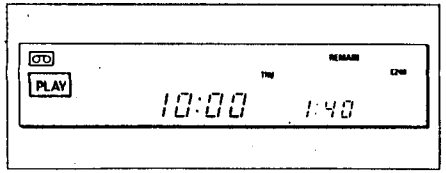


2. Press the COUNTER RESET button and display the E-240 indicator in the display only when an E-240 cassette is used.

Note: Set the COUNTER RESET button correctly matching the tape used. When the setting is wrong, the remaining time display is incorrect.



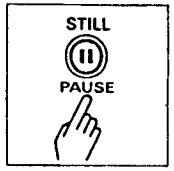
3. Start recording or playback. After approx. 15 seconds, the remaining time appears in the display.



Still playback

Press the STILL/PAUSE button to stop the picture on the screen during playback.

Press the STILL/PAUSE button again to reset to normal playback or the STOP button to stop the tape.

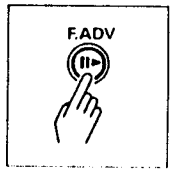


Notes:

- If you see vertical shaking on the TV screen in the still playback mode, rotate the VERT. SYNC. ADJ. control behind the control door to minimize shaking.
- When the still playback mode continues for about 5 minutes, the VTR switches to the stop mode automatically to prevent damage to the tape.
- The playback picture will contain some noise in the still playback mode.

Frame advance

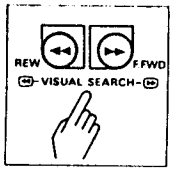
When you hold the F.ADV button on the remote control unit down during the still playback mode, tape will be played back frame by frame. It operates only after STILL/PAUSE button has been pressed.



Visual search

This allows you to view the played back picture at high speed in both the forward and reverse directions.

Press either the REW or F.FWD button during playback, then release it. Pictures can be viewed at high speed in either the forward or reverse direction. Press and hold the REW or F.FWD button in the visual search mode. Pictures can be viewed at higher speed than in normal visual search. Release the button to return to the normal visual search mode. Press the PLAY button to return to normal playback or press the STOP button to stop tape.



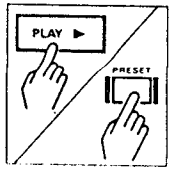
Notes:

- The playback picture will have some horizontal noise bars in the picture.
- More noise bars appear in the picture when the higher speed visual search is started.

NOTE: The picture quality of LP still/search/slow play is slightly worse and may lose colour and also may be vertically unstable.

Auto endless play

Press and hold the PLAY button then press the PRESET button; you can play the tape from the beginning to the end repeatedly. While in auto endless play, you can perform still playback, frame advance and visual search operation. To stop endless play, press the EJECT or OPERATE button.

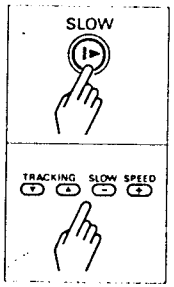


Note: If the counter memory function is turned on, the VTR rewinds the tape to the beginning when "0000" is reached, then starts playback.

Slow function

Press SLOW button on the remote control unit during playback, and the tape is played back at slow speed.

Then use the SLOW SPEED buttons on the remote control unit to vary the playback speed.



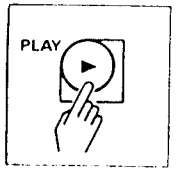
Notes:

- When noise appears in the slow playback pictures, it can be removed by pressing the TRACKING buttons on the remote control unit. Removing the noise in the slow playback also lets you enjoy a noisefree picture in still playback.
- When the slow playback mode continues for about 5 minutes, the VTR switches to the play mode automatically.

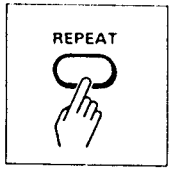
Repeat function

Use this function to repeat the scene you have just viewed during playback.

1 During playback, press the PLAY button at the scene where you want the repeat of the playback to start. The playback continues.



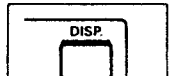
2 Press the REPEAT button on the remote control unit. The VTR enters into the reverse search mode then enters into the playback mode at the position where the PLAY button was pressed.



Index function

Cassette tape may be recorded using the tape indexing feature for rapid location of any section.

- Press the OSD DISP button once to call up the normal status display.



Auto operate off function

If, when you are viewing or recording a TV programme selected with the TV PROG button, the TV programme

TIMER RECORDING

The programmable electronic clock/timer permits the unattended recording of 8 preselected programmes

Index function

Cassette tape may be recorded using the tape indexing feature for rapid location of any section.

To record using indexing feature

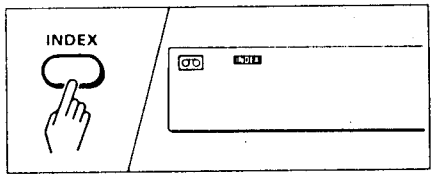
Record as usual. Each time you press the REC button to begin recording, an index signal is recorded on the tape.

Note: The index signal is not recorded if the STILL/PAUSE button is pressed and released during recording. Press the REC button from stop. If two programmes are recorded from the same station with one immediately follows the other, press the STOP button after the first programme. Press the REC button to resume recording. This inserts an index signal at the beginning of each programme.

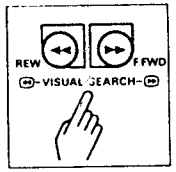
To locate a programme using indexing feature

1 Turn on VTR and insert a cassette which was recorded using the tape indexing feature.

2 Turn on INDEX button on the remote control unit (Indicator lights).



3 Press the REW or F.FWD button. The tape will rewind or fast forward until an index signal is reached. The VTR will enter the playback mode for approximately 10 seconds.



Note: If there is a section with no signal recorded on the tape during fast forward or rewind, the index function may not work properly.

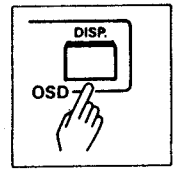
4 Press PLAY button when the desired programme is located.

OSD (On-Screen Display) function

Whenever you turn on your VTR or change the status – from stop to play, play to stop, change stations, etc. – the new status of the VTR is displayed on the TV screen automatically. You can manually call up the VTR status display to the screen when required by *pressing the OSD DISP button on the remote control.*

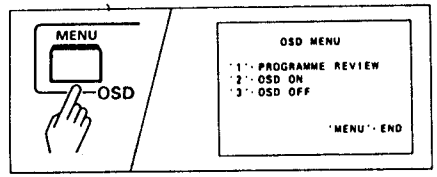
The display will disappear from the screen in a few *seconds.*

- Press the OSD DISP button once to call up the normal status display.
- Press the button twice to call up the tape counter or tape remaining display. This will remain on the screen.
- Press a third time to switch off the tape counter or tape remaining display and to return to a normal display.

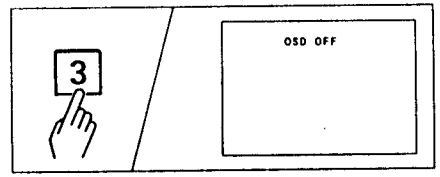


If required, follow the procedure below so no display will appear on the TV screen.

1. Press the OSD MENU button on the remote control unit. The OSD menu appears on the TV screen.



2. Press button number 3. "OSD OFF" will appear on the TV screen to show you that the OSD function is switched off.

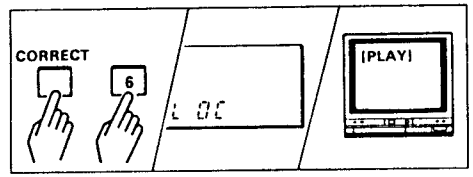


After a few seconds, "OSD OFF" will disappear.

Note: Press button number 2 in step 2 above when you want OSD to reappear.

Mode lock function

When you want to lock the current VTR mode, such as when recording, playing back, etc., press the CORRECT button and button number 6 on the remote control unit simultaneously. When the mode is locked, " L 0C " appears in the VTR display and | | appears in the TV screen if the VTR status is called up.



During the mode lock, the VTR accepts the remote control operations but it does not accept any button operations on the VTR's front panel. To release the mode lock, press the OPERATE switch on the remote control unit.

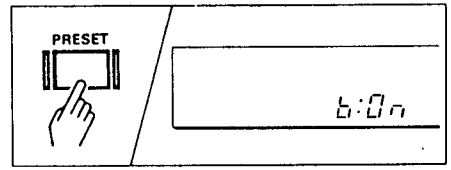
Auto operate off function

If, when you are viewing or recording a TV programme selected with the TV PROG button, the TV programme finishes, the VTR power will be turned off automatically after approx. 8 minutes. However, when "AU" is indicated in the TV station number display of the VTR, this function does not work.

Beep sound

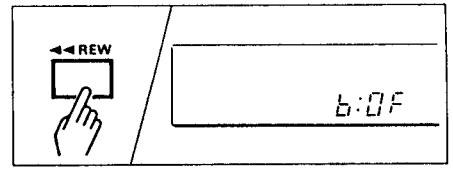
This VTR incorporates a buzzer function. If this function is turned on, a beep sound will be heard when any operation button is pressed. This is convenience in operation. To turn this function on or off, follow the procedure below.

1. Press the PRESET button with the OPERATE switch turned off.



The indication " b:0n " or " b:0F " appears in the display of VTR.

2. Press the REW button.



The indication " b:0n " or " b:0F " appears every time the button is pressed. Select the " b:0n " to turn on this function or select the " b:0F " to turn off this function.

3. After selecting press the PRESET button again.

Automatic rewind

The VTR automatically rewinds the tape when the end of the tape is reached.

Note: To prevent accidental erasure, the VTR does not rewind the tape after timer recording.

Rewind shut off

If the OPERATE switch is pressed during rewind operation, power will be turned off automatically after the tape has been completely rewound.

Note: If the counter memory or index function is turned on, the VTR will stop rewinding and switch off at the specified position.

SC indicator

When you operate the remote control to select TV station 90 (press [9] then [0]), the SC indicator lights in the VTR display. While the SC indicator is lit, you can record the video signal from the VTR's tuner and the audio signal from the EURO jack on the rear of the VTR.

TIMER RECORDING

The programmable electronic clock/timer permits the unattended recording of 8 preselected programmes within a period of 1 year, including the same programme(s) repeated on every day and the same programme(s) every week. It turns the unit on and off and selects the programme automatically.

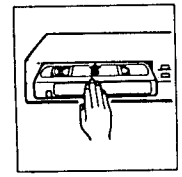
The timer can be programmed with the provided remote control unit. See the supplementary manual for details of the programming procedure with the remote control unit. You must set the clock in the VTR correctly before programming the timer. Also see the supplementary manual for setting the clock.

Preparations for timer recording

- Your TV does not have to be on to make a recording because the VTR records TV programmes without the aid of your TV. It is only used for monitoring.

1 Make sure that the clock shows the present time and day correctly.

2 Insert a cassette.
Be sure to check that the record safety tab is not missing. If the record safety tab is missing, recording will not begin.

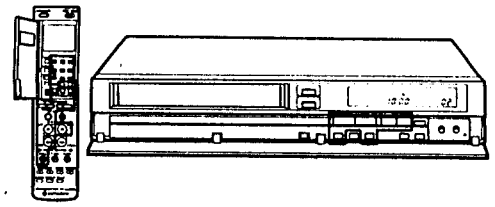


3 Programme the timer.
See the supplementary manual for details.

4 Turn the OPERATE switch off.
If a cassette with its safety tab snapped off is inserted, it will be ejected automatically when power is turned off. In this case, insert a cassette with its safety tab in place or cover the hole with tape.

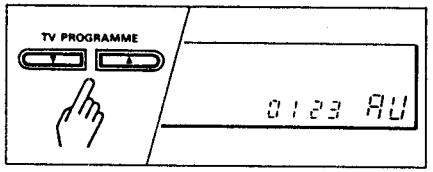
AUDIO DUBBING

Audio dubbing is the process of recording new audio in place of the audio that was formerly recorded. Audio dubbing does not disturb the recorded video. When Audio Dubbing, the source for the Audio Dubbing is "whatever you are hearing".



1 Connect the audio source to 21-pin EURO or A.DUB jack located on the rear panel of the VTR.

2 Press the TV PROGRAMME button to select the AU (auxiliay iput) position.
Note: You can also select "AU" by pressing buttons [9] and [1] on the remote control unit.

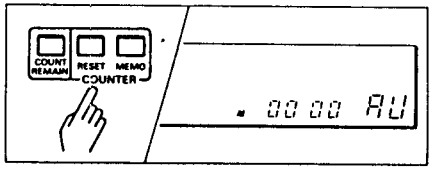


3 Play the tape you indend to modify to the point where dubbing is to end and press STOP.

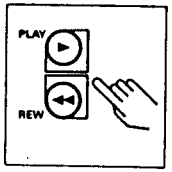
4 Press the COUNT/REMAIN button to display the tape counter in the display.

5 Press COUNTER MEMO button, and the "M" appears in the display.

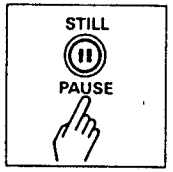
6 Press the COUNTER RESET button to set the tape counter to 0000.



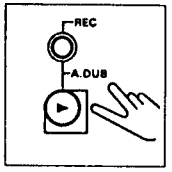
7 Press the PLAY button and then use the REW button to locate a point a few seconds before dubbing is to begin.



8 Press the PLAY button and then the STILL/PAUSE button exactly where dubbing is to begin.
The VTR enters the play/pause mode.



9 Press and hold the A.DUB button (left one of REC buttons) then press the PLAY button.

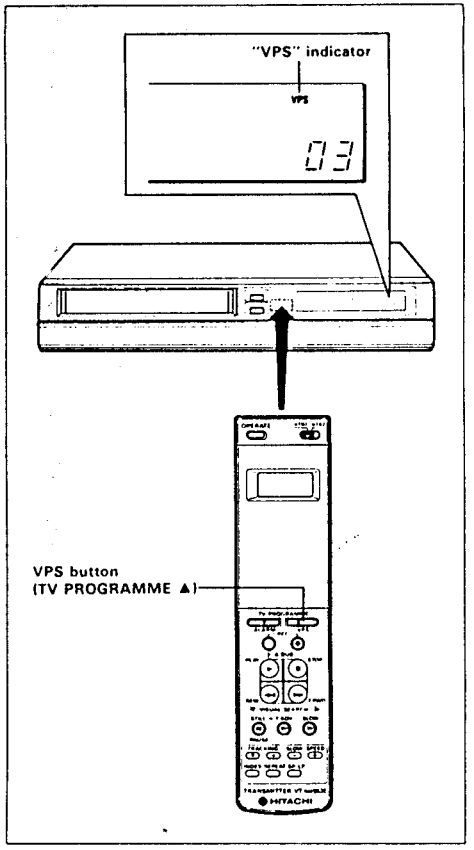


10 Press the PAUSE button to begin dubbing.

The VTR will stop at counter reading 0000. If you do not want the audio dubbing to stop at a predetermined point, omit steps 3 through 6, and press the STOP button to stop dubbing.

VPS (Video Programme System) FUNCTION (Only for VT-545E(VPS)/546E(VPS))

This VTR incorporates the VPS function.
If the VTR is tuned to a TV station transmitting a VPS signal, the VTR automatically takes any delay, earliness or extension of the programme into account and can record the specified programme.
For example, assume that you programme the timer for a football game on station 8 from 19:00 to 20:45 on Saturday and the football game which is broadcast is changed to 21:00 to 23:00, the VPS function works and the VTR records the football game automatically from 21:00 to 23:00.
When the VTR is tuned to a station transmitting a VPS signal, "VPS" automatically appears in the display of the VTR.
Programming the timer for unattended recording automatically turns on the VPS function.



NOTES:

1. To switch off the VPS function, press the VPS button once during programming of the timer so the "VPS" display disappears.
   Pressing the button again turns VPS on.
2. Always programme the timer for one TV programme to record the programme with the VPS function turned on. If you programme the timer for a football game and a movie on station 3 sequentially from 10:00 to 14:00 for example, only the football game will be recorded but the movie will not.
   In this case, programme the timer with the VPS off or input the other programme using another programme number to turn the VPS function on again.
3. When the VTR is tuned to a station transmitting a VPS signal but the signal conditions are poor, "VPS" will disappear from the display.
   In this case, programme the timer with VPS turned off. If you programme the timer with VPS turned on, the VPS function does not operate normally.
4. This function can also be used during ordinary recording as an auto stop function. When the VTR is recording a TV programme transmitting the VPS signal, the VPS indicator will light automatically; press the VPS button at this time. The VPS indicator will change to flashing. When the TV programme ends, the recording will stop automatically and the VTR will enter the stop mode.

DISASSEMBLY

1. IDENTIFICATIONS AND LOCATIONS OF CIRCUIT BOARDS

(See page 2-4 for details on removing the following circuit boards.)

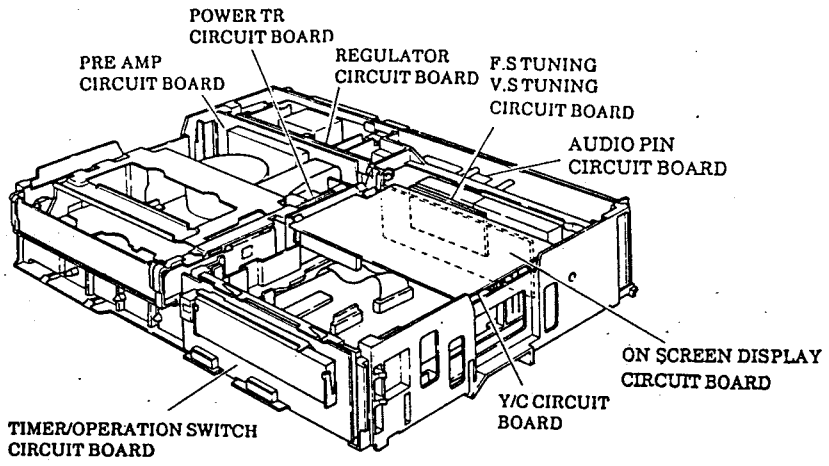


Fig. 1-1 Top View

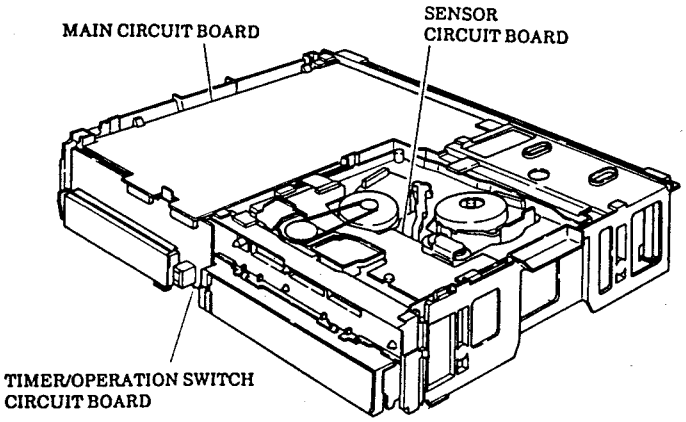
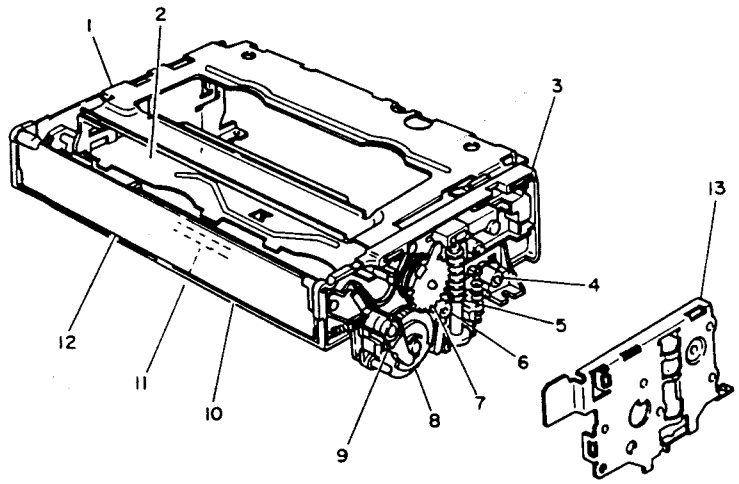


Fig. 1-2 Bottom View

2. IDENTIFICATIONS AND LOCATIONS OF MAIN MECHANICAL COMPONENTS

(See page 2-5 for details on removing the following components.)



1. CHASSIS HOLDER
2. CASSETTE HOLDER
3. GEAR BRACKET
4. SWITCH LEVER B
5. FL WORM GEAR
6. SWITCH LEVER A
7. WORM WHEEL
8. DRIVE GEAR
9. DOOR ARM
10. FRONT HOLDER
11. SHAFT PIN
12. CASSETTE DOOR
13. SIDE CHASSIS

Fig. 2-1 Cassette Loading Mechanism

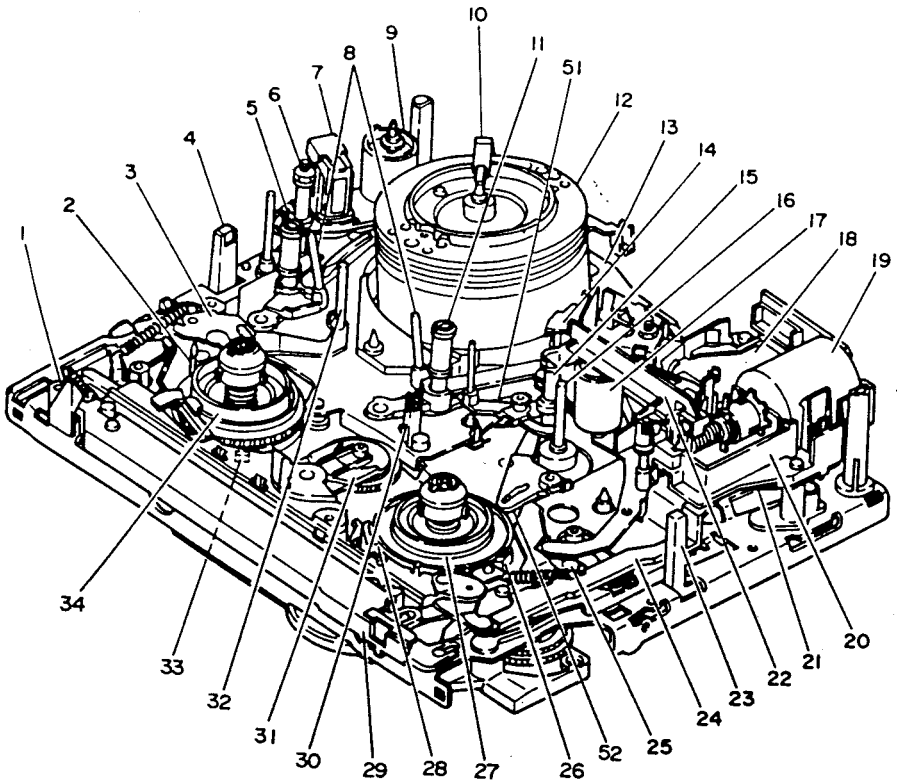


Fig. 2-2 Top View of Mechanism

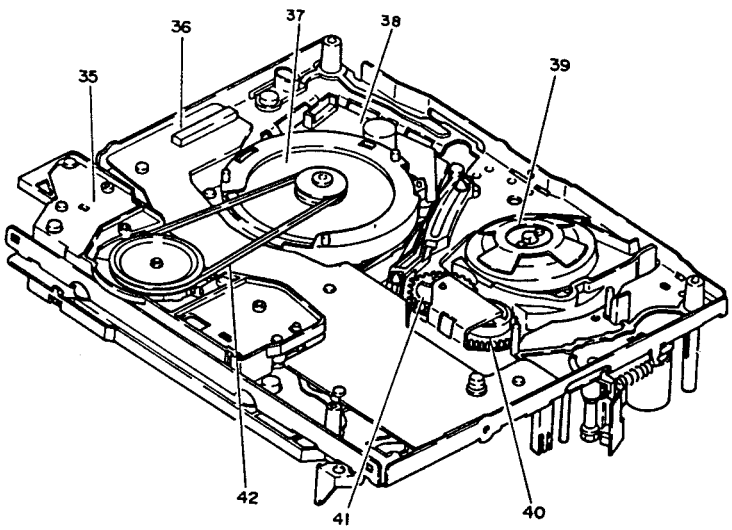


Fig. 2-3 Bottom View of Mechanism

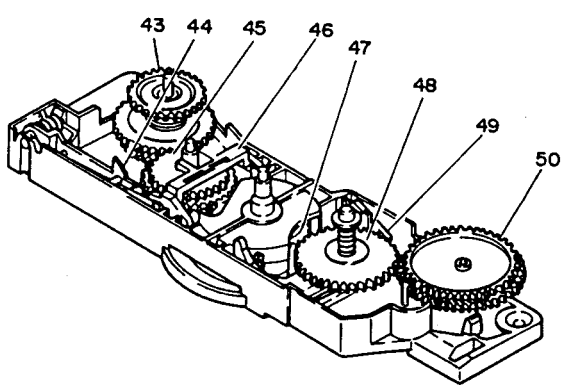


Fig. 2-4 Clutch Base

1. SAFETY ARM
2. TENSION BAND
3. TENSION ARM
4. SUPPLY REEL SENSOR
5. SUPPLY GUIDE ROLLER
6. SUPPLY GUIDE POLE
7. FULL ERASE HEAD
8. ANGLE POSTS
9. IMPEDANCE ROLLER
10. STATIC DISCHARGE BRUSH
11. TAKE-UP GUIDE ROLLER
12. CYLINDER MOTOR ASSEMBLY
13. CYLINDER BASE
14. AUDIO/CONTROL (A/C) HEAD
15. TAKE-UP POLE
16. CAPSTAN SHAFT
17. PRESSURE ROLLER ASSEMBLY
18. MECHANISM STATE SWITCH
19. LOADING MOTOR ASSEMBLY
20. LOADING MOTOR HOLDER
21. LOAD BRACKET ASSEMBLY
22. CASSETTE LID OPENER
23. TAKE-UP REEL SENSOR
24. BRAKE LINK ARM
25. PRESSURE ROLLER OPERATION AR
26. TAKE-UP BRAKE ASSEMBLY
27. TAKE-UP REEL DISK
28. TAKE-UP MAIN BRAKE
29. SLIDER BLOCK ASSEMBLY
30. END LAMP
31. REEL DRIVE IDLER
32. TENSION POLE
33. SUPPLY MAIN BRAKE
34. SUPPLY REEL DISK
35. CLUTCH BASE ASSEMBLY
36. SENSOR P.C.B
37. CAPSTAN MOTOR ASSEMBLY
38. CAPSTAN MOTOR P.C.B
39. CYLINDER MOTOR ASSEMBLY
40. SUPPLY LOADING GEAR
41. TAKE-UP LOADING GEAR
42. REEL BELT
43. TAKE-UP GEAR
44. CLUTCH ARM
45. CHANGE GEAR
46. CHANGE ARM
47. TAKE-UP PULLEY
48. FL CHANGE GEAR
49. FL CHANGE ARM
50. RELAY GEAR
51. HALF LOADING ARM
52. RELAY ARM

3. CASE REMOVAL

1. Top Cover, Bottom Cover, Front Panel and Preset Door
2. Rear Panel
3. Remote Controller

1. Top Cover, Bottom Cover, Front Panel and Preset Door (Fig. 3-1)

Top Cover

1) Remove three (3) screws. Lift the rear of the top cover and slide the entire cover backwards.

Bottom Cover

2) Remove seven (7) screws holding the bottom cover.

Front Panel

3) Release five (5) stoppers. Tilt the top of the panel to the front and release three (3) stoppers at the bottom of the panel, then pull out the entire panel.

Preset Door

4) Open the preset door, and while depressing the attachment sections, pull the door in the direction of the arrows to release four (4) linked sections.

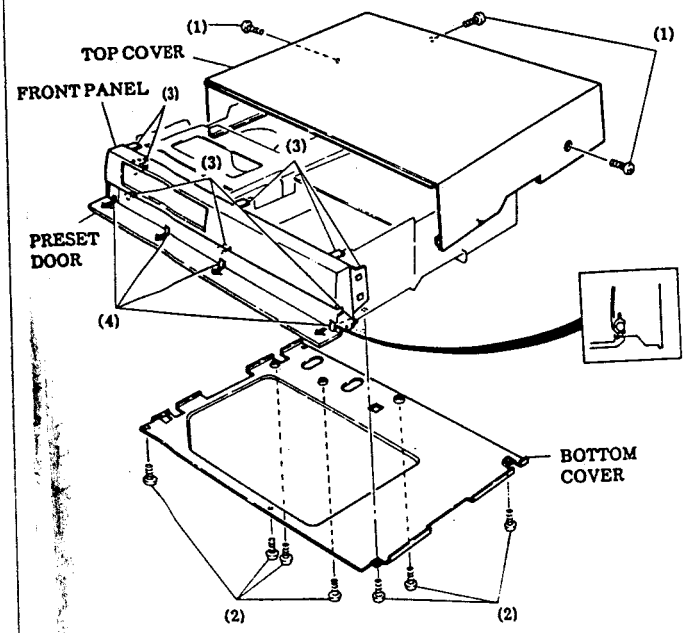


Fig. 3-1 Top Cover, Bottom cover, Front Panel and Preset Door

2. Rear Panel (Fig. 3-2)

1) Remove the top and bottom covers and front panel. (See item 1)
2) Remove the main circuit board. (See item 3 in the section on circuit board removal)
3) Remove one (1) screw and remove the RF converter holder.
4) Remove one (1) screw.

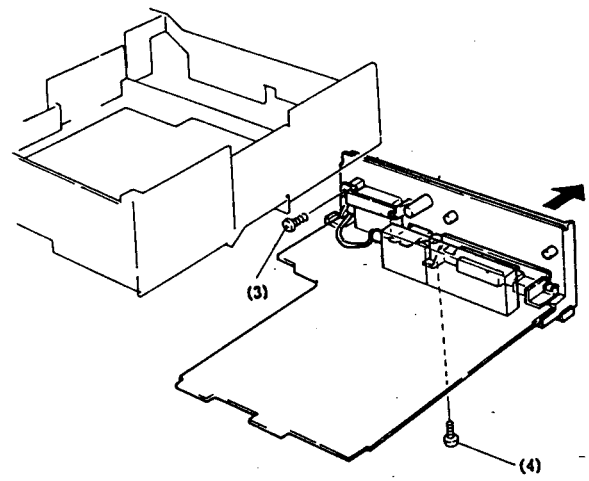


Fig. 3-2 Rear Panel

3. Remote Controller (Fig. 3-3)

1) Remove the battery compartment lid.
2) Remove one (1) screw inside the battery compartment.
3) Release eight (8) tabs.

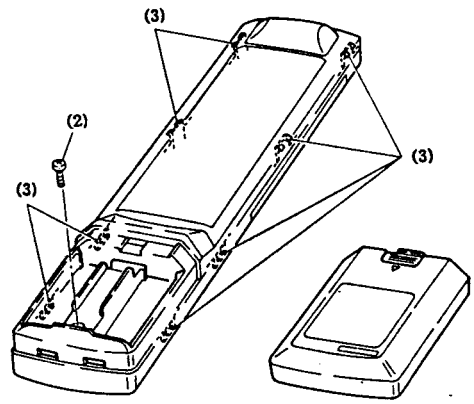


Fig. 3-3 Remote Controller

4. CIRCUIT BOARD REMOVAL

1. Y/C, ON SCREEN DISPLAY and F.S/V.S Tuning Circuit Boards
2. Timer/Operation Switch Circuit Board
3. Main Circuit Board
4. Audio PIN Circuit Board
5. Regulator and Power Tr Circuit Boards
6. Pre-Amp Circuit Board
7. Sensor Circuit Board

1. Y/C, ON SCREEN DISPLAY and F.S/V.S Tuning Circuit Boards (Fig. 4-1)

Y/C Circuit Borad

1) Remove the top cover. (See item 1 in the section on case removal)
2) Remove two (2) screws and release two (2) stoppers.
3) Disconnect two (2) connectors.
4) Remove one (1) screw and release the earth wire.
5) Disconnect two (2) connectors.

ON SCREEN DISPLAY Circuit Board

6) Pull out the OSD circuit board.

F.S/V.S Tuning Circuit Board

7) Pull out the F.S/V.S tuning circuit board.

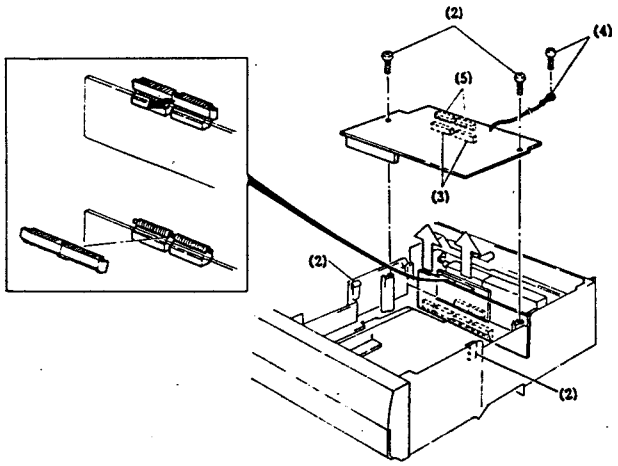


Fig. 4-1 Y/C, ON SCREEN DISPLAY and F.S/V.S Tuning Circuit Boards

2. Timer/Operation Switch Circuit Board (Fig. 4-2)

1) Remove the top and bottom covers and the front panel. (See item 1 in the section on case removal)
2) Release two (2) stoppers and tilt the timer/operation Switch circuit board to the front as shown by the arrow.
3) Disconnect two (2) connectors from the main circuit board.

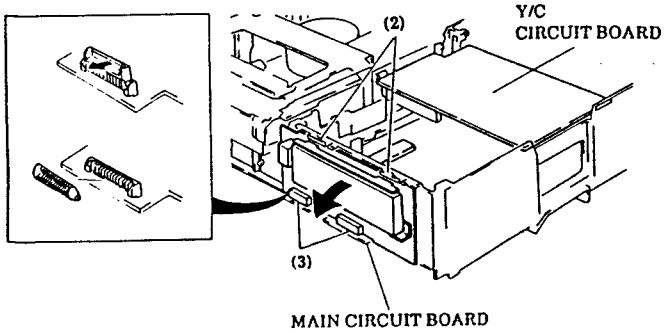


Fig. 4-2 Timer/Operation Switch Circuit Board

3. Main Circuit Board (Fig. 4-3)

1) Remove the top and bottom covers and front panel. (See item 1 in the section on case removal)
2) Remove the Y/C, OSD and F.S/V.S tuning circuit boards. (See item 1)
3) Remove the timer/operation switch circuit board. (See item 2)
4) Disconnect eight (8) connectors and one (1) flat cable.
5) Remove one (1) screw and release five (5) stoppers.

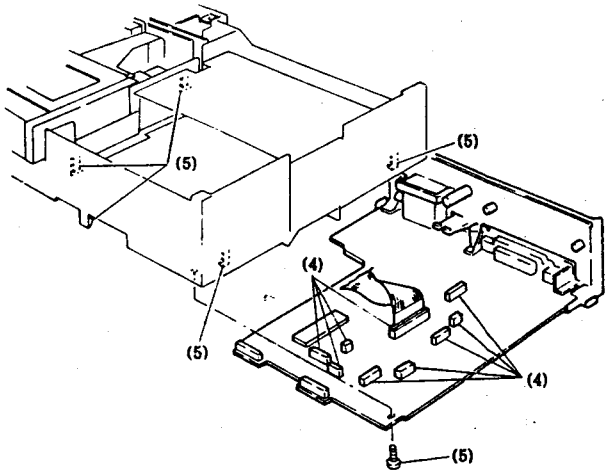


Fig. 4-3 Main Circuit Board

4. Audio PIN Circuit Board (Fig. 4-4)

1) Remove the rear panel.(See item 2 in the section on case removal)
2) Disconnect one (1) connector.
3) Remove one (1) screw.

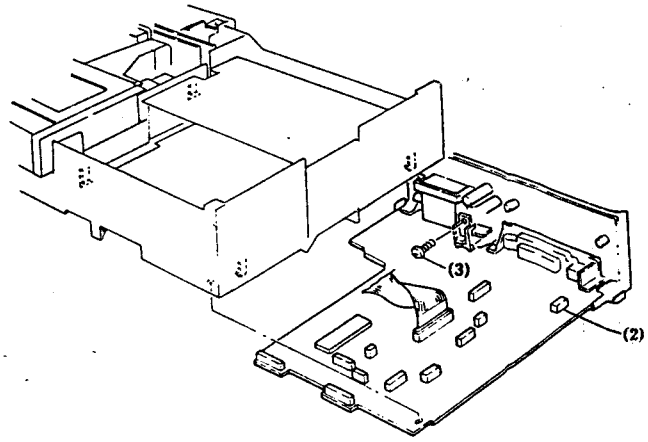


Fig. 4-4 Audio PIN Circuit Board

5. Regulator and Power Tr Circuit Boards (Fig. 4-5)

Regulator Circuit Board

1) Remove the top cover. (See item 1 in the section on case removal)
2) Remove one (1) screw on the bottom cover.
3) Remove four (4) screws.
4) Disconnect three (3) connectors.

Power Tr Circuit Board

5) Remove one (1) screw.
6) Disconnect one (1) connector.

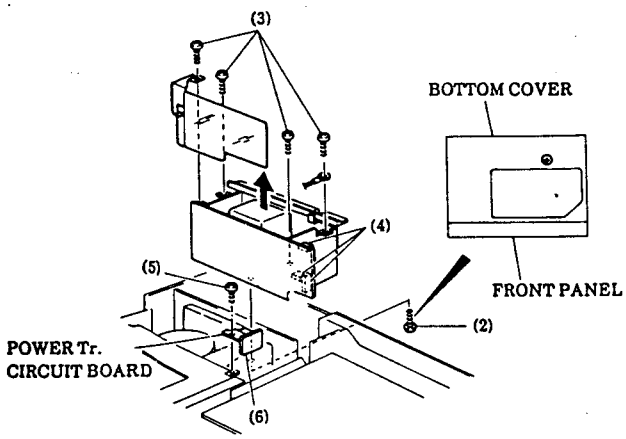


Fig. 4-5 Regulator and Power Tr Circuit Boards

6. Pre-amp Circuit Bord (Fig. 4-6)
1) Remove the top cover. (See item 1 in the section on case removal)
2) Disconnect two (2) connector.
3) Remove two (2) screws and pull out the pre-amp circuit board.

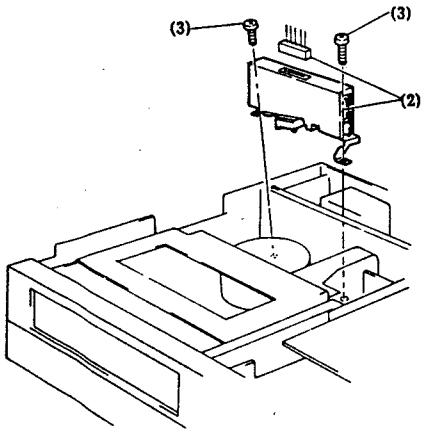


Fig. 4-6 Pre-amp Circuit Board

7. Sensor Circuit Board (Fig. 4-7)
1) Remove the bottom cover. (See item 1 in the section on case removal)
2) Disconnect one (1) flat cable.
3) Disconnect one (1) connector.
4) Remove the reel drive belt.
5) Remove four (4) screws and lift up the sensor circuit board.

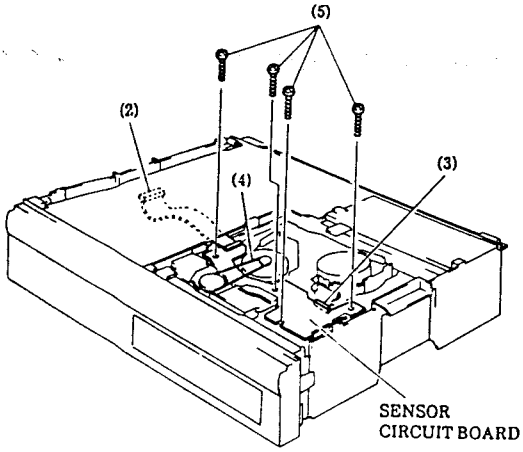


Fig. 4-7 Sensor Circuit Board

5. CASSETTE LOADING MECHANISM REMOVAL

1. Cassette Loading Mechanism and Cassette Door
   * Components listed below are described as if the top and bottom covers, front panel and the cassette loading mechanism have already been removed. (See item 1 in the section on case removal and item 1 in the section on cassette loading mechanism removal.)

2. Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Front Holder

3. Cassette Holder Base and Cassette Holders (L/R)

1. Cassette Loading Mechanism and Cassette Door (Fig. 5-1)

Cassette Loading Mechanism
1) Remove the top cover and front panel. (See item 1 in the section on case removal.)
2) Remove one (1) screw and release the shield cover.
3) Remove two (2) screws.
4) Lift up the rear of the cassette loading mechanism and release the fittings on the front bottom.

Cassette Door
5) Push the left of the front holder outward in the direction of the arrow and remove the cassette door.

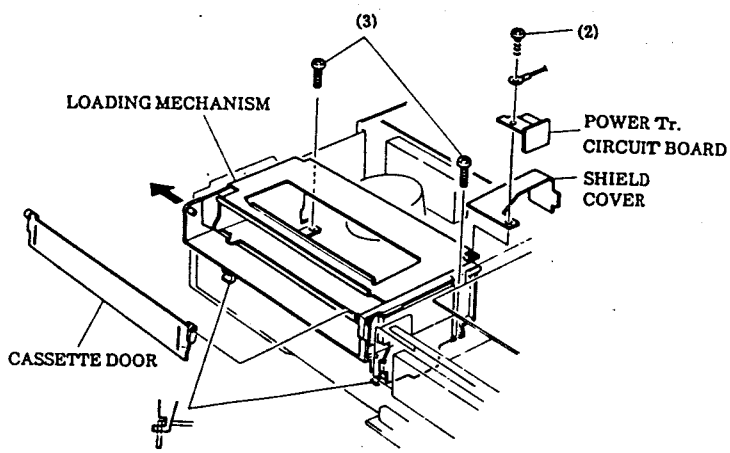


Fig. 5-1 Cassette Loading Mechanism and Cassette Door

2. Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Front Holder (Fig. 5-2)

Loading Gear Assembly
1) Release two (2) tabs that engage with the chassis holder and one (1) tab that engages with the front holder, then separate the loading gear assembly.

Chassis Holder
2) Release two (2) tabs that engage with the front holder.

Cassette Holder Assembly
3) Separate the drive gear and remove the cassette holder assembly.

Front Holder
4) Remove the shaft pin and drive arm L from the front holder.

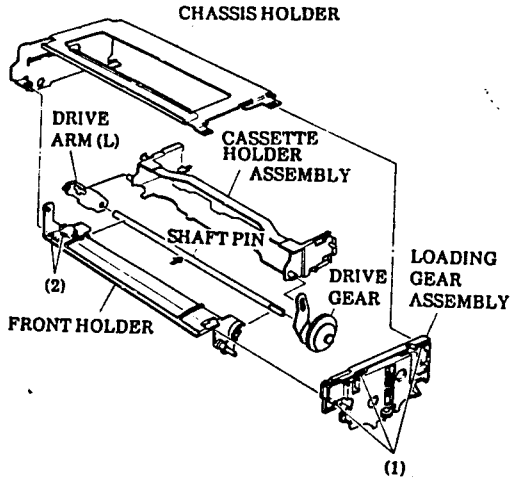


Fig. 5-2 Loading Gear Assembly, Chassis Holder, Cassette Holder Assembly and Front Holder

3. Cassette Holder Base and Cassette Holders (L/R) (Fig. 5-3)

Cassette Holder Base

1) Release four (4) tabs on the cassette holders (L/R).

Cassette Holders (L/R)

2) Release two (2) tabs on the cassette holders (L/R) and pull out the holders.

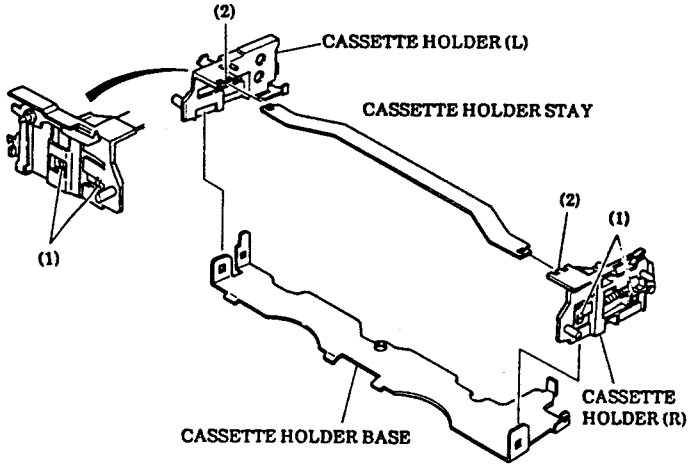


Fig. 5-3 Cassette Holder Base and Cassette Holders (L/R)

[Cautions when reinstalling]

Reinstall the components by the reverse procedure to removal, taking care of the following items.

* Check that two (2) bosses of the cassette holder are inserted into the grooves on the left of the chassis holder.
* When reinstalling the loading gear assembly, check that two (2) bosses of the cassette holder are inserted into the grooves on the right of the chassis holder.
* Check that marking (△) on the synchro gear and marking (◇) on the clutch gear are aligned.
* Check that the boss of cassette switch lever (A) is set to the cam of the synchro gear.
* When reinstalling the cassette door, check that the boss of the door arm is inserted into the groove in the cassette door.

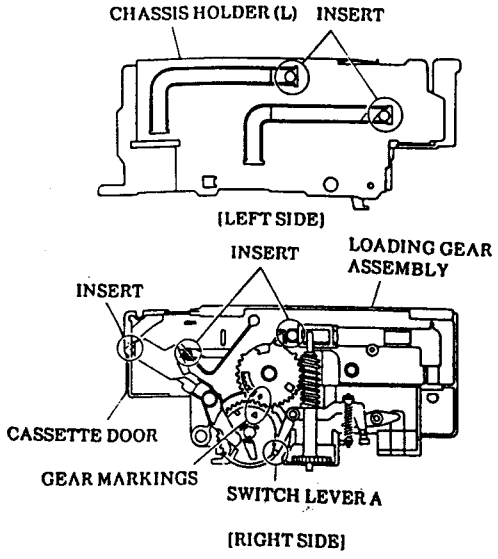


Fig. 5-4

6. LOADING GEAR REMOVAL

1. Side Chassis, FL Worm Gear, Door Arm, Worm Wheel and Switch Levers (A/B) (Fig. 6-1)

Side Chassis

1) Release four (4) tabs that engage with the loading gear assembly.

FL Worm Gear

2) Pull out the FL worm gear.

Door Arm

3) Remove the spring between the door arm and gear bracket.
4) Pull out the door arm.

Worm Wheel

5) Pull out the worm wheel.

Switch Levers A/B

6) Remove the spring between switch lever (A) and the gear bracket.
7) Pull out switch levers (A) and (B).

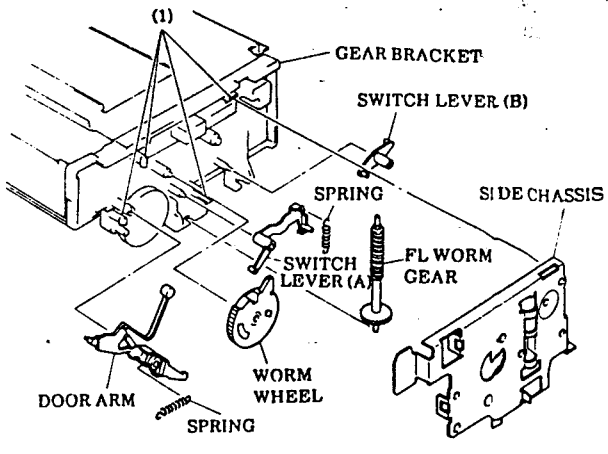


Fig. 6-1 Side Chassis, FL Worm Gear, Door Arm, Worm Wheel and Switch Levers A/B

7. MAIN MECHANICAL COMPONENTS REMOVAL

1. Video Heads and Cylinder Motor Assembly
2. Impedance Roller/FE (Full Erase) Head and A/C (Audio/Control) Head

Motors and Sensors

3. Capstan Motor Assembly
4. Loading Motor/Mechanism State Switch Assembly.

Miscellaneous

5. Tension Arm/Tension Band
6. Slider Block Assembly and Reel Drive Idler
7. Supply/Take-up Reel Disks, Half Loading Arm and Relay Arm
8. Rollers and Guides
   - O Pressure Roller Assembly
   - O Supply/Take-up Guide Poles
   - O Supply/take-up Guide Rollers
9. Loading Motor Block, Brake Link Arm,Brake Change Arm and FS Brake Arm
10. Load Bracket Assembly and Take-up Brake Assembly
11. Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Brake Lift Arm
12. Cylinder Motor Base and Supply/Take-up Loading Arms
13. Take-up Pulley and Clutch Gear Assembly
14. Take-up Gear, Change Arm, Change Gear, Relay Gear, FL Change Gear and FL Change Arm

1. Video Heads and Cylinder Motor Assembly (Fig. 7-1)

1) Remove the top cover. (See item 1 in the section on case removal)
2) Pull out the pre-amp circuit board. (See item 5 in the section on circuit board removal)
3) Remove one (1) screw holding the static discharge brush.
4) Remove two (2) screws and pull the upper cylinder. (Bottom Side)
5) Remove the bottom cover. (See item 1 in the section on case removal)
6) Disconnect the connector from the cylinder motor circuit board.
7) Remove three (3) screws holding the cylinder. (Top Side)
8) Pull out the cylinder motor assembly upward.

[Cautions during work]

* Since the upper cylinder has connectors, do not apply pressure in the direction of rotation. Pull the cylinder verricaly upward in the direction of cylinder attachment.
* Place the side of the unit down as the screws are in the reverse positions to the direction in which the cylinder is removed.
* Do not touch the video head tips with fingers or tools.
* Insert so that the arrow on the rotary transformer matches the blue side of the video head connector.
* Alterenately tighten the two (2) screws holding the upper cylinder.

[Adjustments after reinstallation]
Adjustments after replacing the cylinder

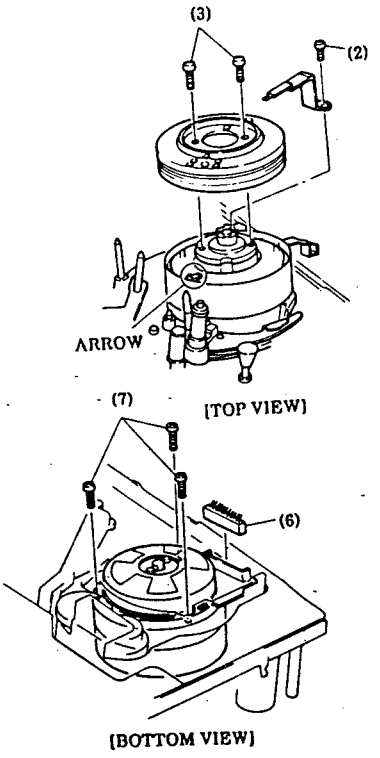


Fig. 7-1 Video Heads and Cylinder Motor Assembly

2. Impedance Roller/FE (Full Erase) Head and A/C (Audio/Control) Head (Fig. 7-2)

Impedance Roller / FE (Full Erase) Head

1) Remove the top cover. (See item 1 in the section on case removal)
2) Remove the spring between the FE head base and chassis.
3) Disconnect the connector.
4) Remove the nut holding the guide pole and pull out the pole.
5) Release one (1) tab and remove the impedance roller/FE head base.
6) To separate the FE head, release two (2) tabs and pull out the FE head.

A/C (Audio/Control) Head

7) Disconnect the connector.
8) Remove the nut holding the head base and pull the head base up and out.

* Hook the bottom of the spring under the head base to the chassis and the top to the stopper of the head base.

[Cautions when reinstalling]

* Check that the spring section of the A/C head retaining screw protrudes 6.3 mm above head base (1)
* Check that head bases (1) and (2) are parallel.

[Adjustments after reinstallation]

A/C Head Adjustment
X-Value Adjustment
Audio Playback Level Adjustment
Audio Bias Level Adjustment

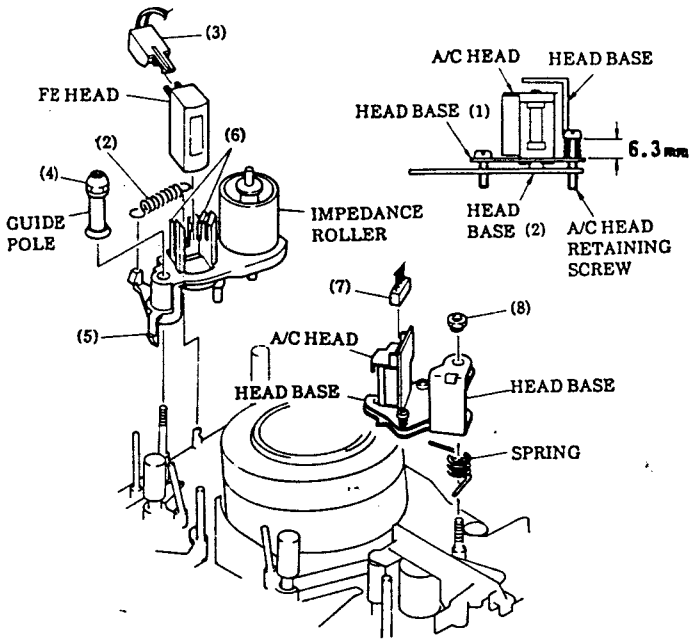


Fig. 7-2 Impedance Roller/FE (Full Erase) Head and A/C (Audio / Control) Head

3. Capstan Motor Assembly (Fig. 7-3)
   1) Remove the bottom cover. (See item 1 in the section on case removal)
   2) Remove the reel belt.
   3) Disconnect the connector.
   4) Remove three (3) screws and pull out the capstan motor assembly.

   * Keep the capstan shaft clean when removing and reinstalling the capstan motor assembly.

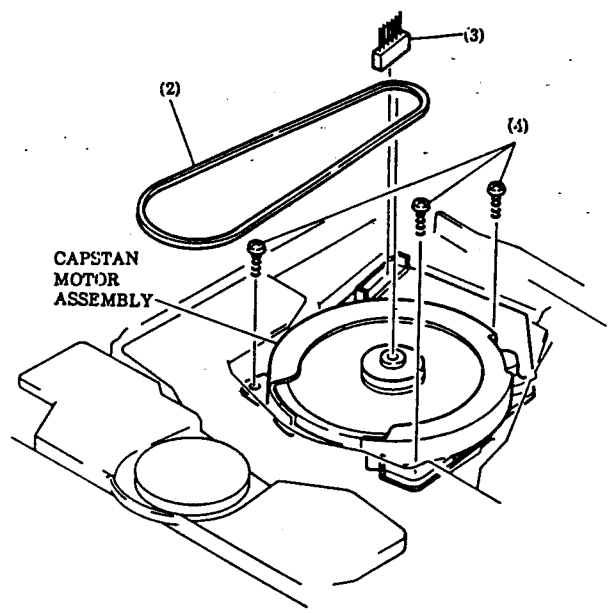


Fig. 7-3 Capstan Motor Assembly

4. Loading Motor / Mechanism State Switch Assembly (Fig. 7-4)
   1) Remove the top cover. (See item 1 in the section on case removal.)
   2) Remove one (1) tab.
   3) Disconnect the connector.
   4) Release two (2) tabs holding the mechanism state switch.
   5) Release four (4) tabs, and while releasing two (2) bosses of the motor holder from the screw holes in the motor, lift up the loading motor/mechanism state switch assembly.

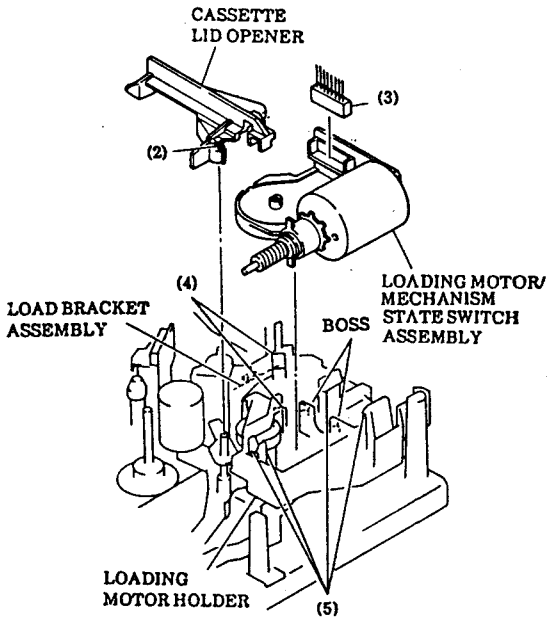


Fig. 7-4 Loading Motor/Mechanism State Switch Assembly

* Components 5-11 listed below will be discribed as if the top and bottom covers, front panel and the cassette loading mechanism have already been removed. (See item 1 in the section on case removal and item 1 in the section on cassette loading mechanism.)

5. Tension Arm / Tension Band (Fig. 7-5)
   1) Remove the spring between the tension arm and spring holder.
   2) Remove one (1) screw.
   3) Release the fitting with the tension arm, move the supply subbrake in the direction of the arrow and remove the tension band and tension arm.

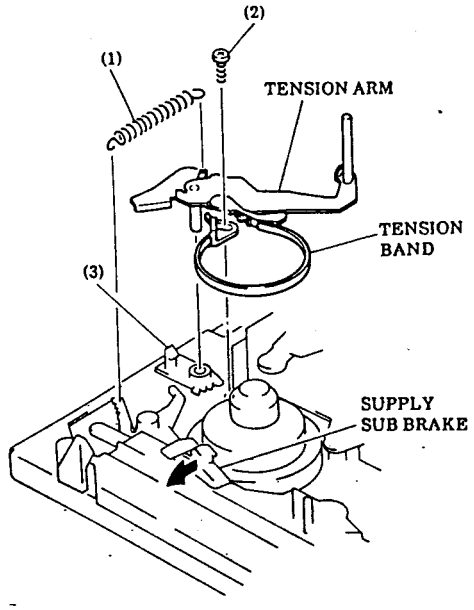


Fig. 7-5 Tension Arm/Tension Band

6. Slider Block Assembly and Reel Drive Idler (Fig. 7-6)

Slider Block Assembly

1) Remove two (2) screws.

[Cautions when reinstalling]

* Reinstall the slider block assembly while pressing both subbrakes and the supply main brake in the directions of the arrows (A/B).
* Check that the bosses of the load bracket assembly are inserted into the sliders.

Reel Drive Idler

2) Pull out the reel drive idler from the take-up gear shaft.

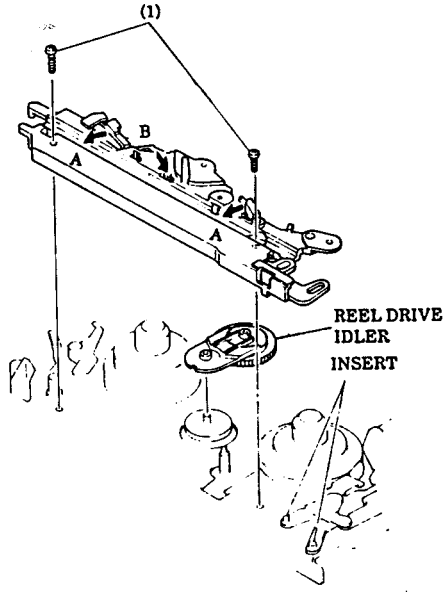


Fig. 7-6 Slider Block Assembly and Reel Drive Idler

7. Supply/Take-up Reel Disks, Half Loading Arm and Relay Arm (Fig. 7-7)

Supply Reel Disk

1) Remove the slider block assembly. (See item 6)
2) Remove the tension arm and tension band. (See item 5)
3) Pull out the supply reel disk.

[Caution when reinstalling]

* Check that a spacer is put on the reel disk installation shaft.

[Adjustments after reinstallation]

Tension Pole Position and Tension Adjustments
Reel Disk Height Adjustment

Take-up Reel Disk

4) Move the take-up brake and pull out the take-up reel disk.

[Caution when reinstalling]

* Check that a spacer is put on the reel disk installation shaft.

[Adjustments after reinstallation]

Reel Disk Height Adjustment

Half Loading Arm

5) Remove the washer and pull out the arm upward.

* Hook the bottom of the spring under the half loading arm to the stopper of the take-up guide pole and the top to the stopper of the half loading arm.

Relay Arm

6) Release one (1) tab in the direction of the arrow and remove the relay arm.

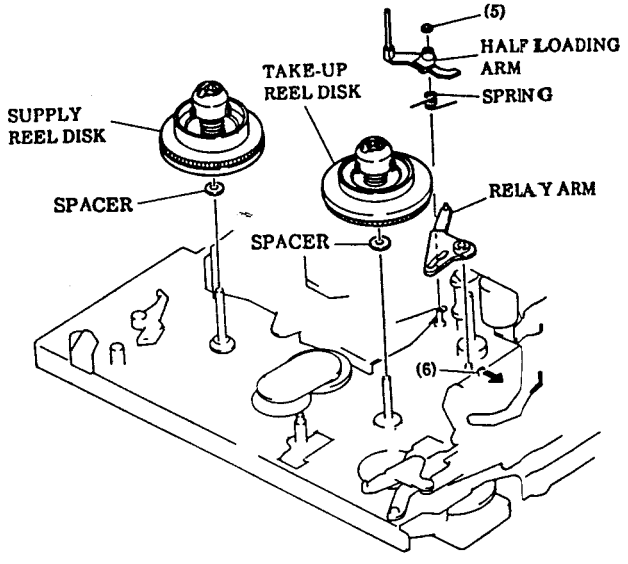


Fig. 7-7 Supply/Take-up Reel Disks, Half Loading Arm and Relay Arm

8. Rollers and Guides (Fig. 7-8)

Pressure Roller Assembly
1) Release one (1) tab.
2) Pull out the pressure roller assembly.

[Cautions when reinstalling]
* Check that the pin of the pressure roller assembly is inserted into the hole in the pressure roller operation arm.
* Clean the tape contact surface of the pressure roller assembly.

Supply/Take up Guide Poles
* Remove the supply and take-up guide poles by the same procedure.

3) Loosen the guide pole retaining screw and pull out the supply and take up guide poles.

[Caution when reinstalling]
* Clean the tape contact surface of the guide pole.

[Adjustment after reinstallation]
Guide Pole Height Adjustment

Supply/Take up Guide Rollers
* Remove the supply and take-up guide rollers by the same procedure.

4) Loosen the guide roller retaining hexagonal screw.
5) Turn the guide roller counterclockwise to pull it out.

[Adjustment after reinstallation]
Guide Roller Height Adjustment

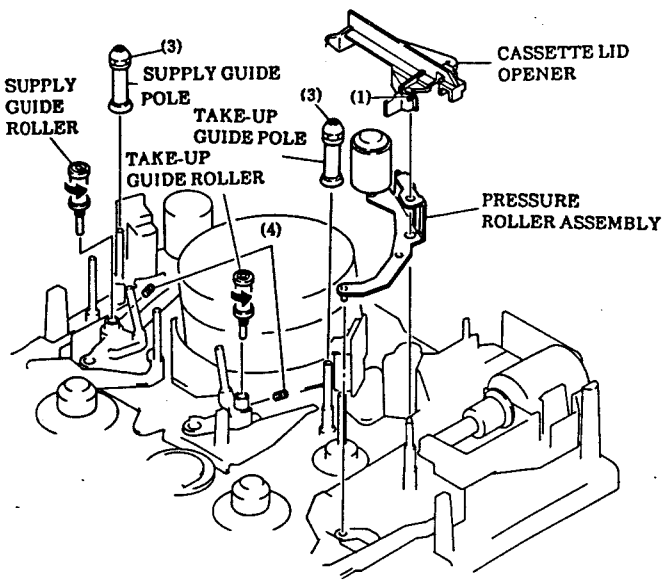


Fig. 7-8 Rollers and Guides

9. Loading Motor Block, Brake Link Arm, Brake Change Arm and FS BrakeArm (Fig. 7-9)

Loading Motor Block
1) Release one (1) tab.
2) Disconnect the connector from the loading motor circuit board.
3) Remove two (2) screws and release three (3) tabs.
4) Remove the loading motor and motor holder while holding the section indicated by arrow (A) so that the load bracket assembly does not lift.

[Adjustment after reinstallation]
Mechanism State Switch Adjustment

Brake Link Arm
5) Remove the slider block assembly. (See item 6)
6) Remove the take-up reel disk. (See item 7)
7) Remove the spring between the brake link arm an load bracket assembly.
8) Release the boss of the brake change arm an remove the brake link arm.

FS Brake Arm
9) Remove the spring between the FS brake arm and mechanism chassis.
10) Release one (1) tab and pull out the FS brake arm.

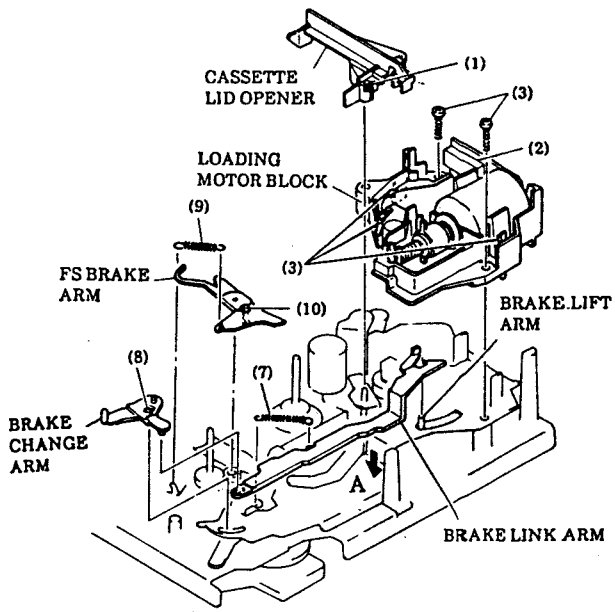


Fig. 7-9 Loading Motor Block, Brake Link Arm, Brake Change Arm and FS Brake Arm

10. Load Bracket Assembly and Take-up Brake Assembly (Fig. 7-10)

Load Bracket Assembly
1) Remove the slider block assembly. (See item 6)
2) Remove the take-up reel disk. (See item 7)
3) Remove the pressure roller assembly. (See item 8)
4) Remove the loading motor block. (See item 9)
5) Remove the brake link arm. (See item 9)
6) Remove one (1) screw and draw the boss of the loading slide gear through the hole in the lift arm to lift up the assembly.

Take-up Brake Assembly
7) Release one (1) tab and remove the take-up brake assembly.

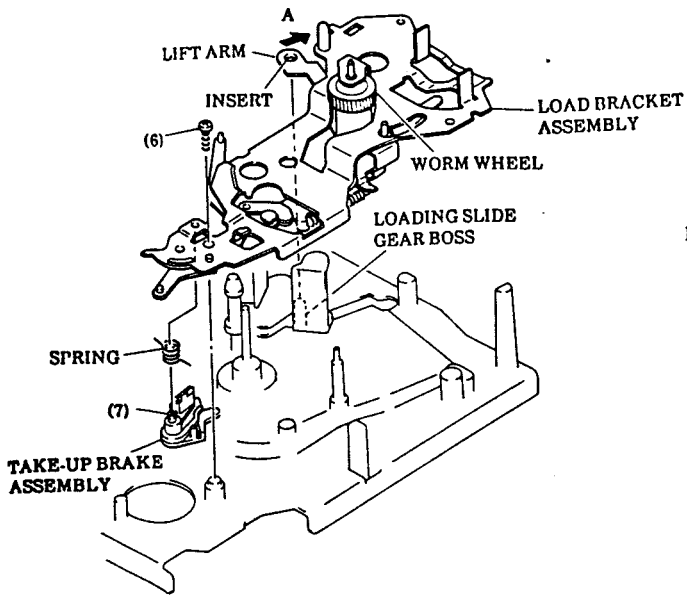


Fig. 7-10 Load Bracket Assembly and Take-up Brake Assembly

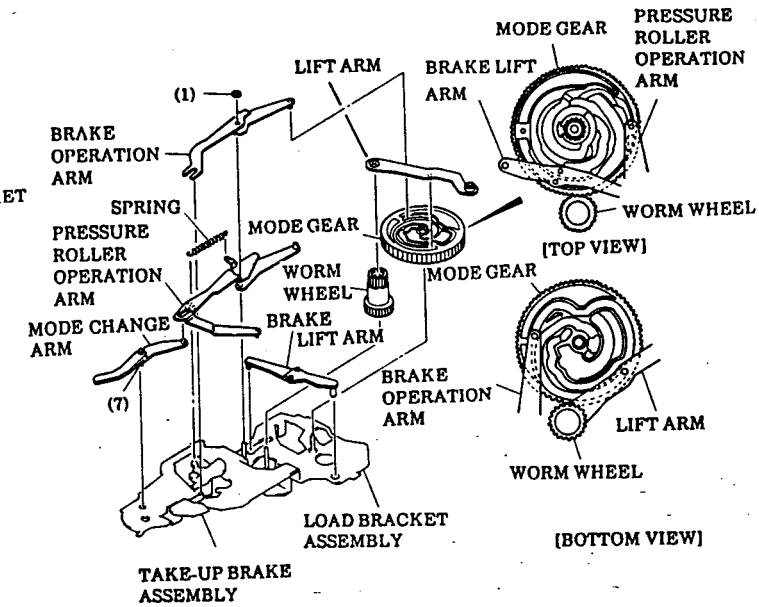


Fig. 7-11 Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Brake Lift Arm

* Components in item 11 below will be described as if the load bracket assembly has already been removed.

11. Brake Operation Arm, Mode Gear, Worm Wheel, Pressure Roller Operation Arm, Mode Change Arm and Brake Lift Arm (Fig. 7-11)

Brake Operation Arm
1) Remove the washer and pull out the brake operation arm.

Mode Gear
2) Pull out the lift arm.
3) Pull out the mode gear.

Worm Wheel
4) Pull out the worm wheel.

Pressure Roller Operation Arm and Mode Change Arm
5) Remove the spring between the pressure roller operation arm and load bracket assembly.
6) Pull out the pressure roller operation arm.
7) Release one (1) tab and pull out the mode change arm.

Brake Lift Arm
8) Pull out the brake lift arm.

12. Cylinder Motor Base and Supply/Take-up Loading Arms (Fig. 7-12)

Cylinder Motor Base
1) Remove the cassette loading mechanism. (See item 1 in the section on cassette loading mechanism removal)
2) Remove the cylinder motor assembly. (See item 1)
3) Remove three (3) screws and take out the cylinder motor base.

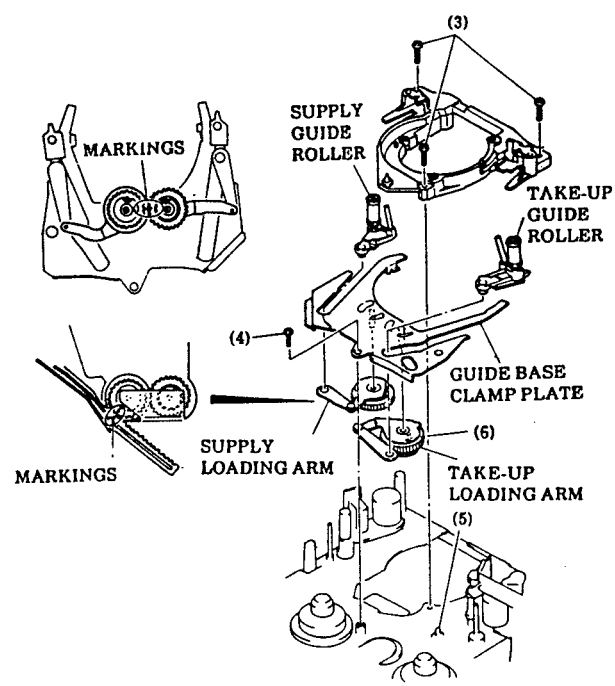


Fig. 7-12 Cylinder Motor Base and Supply/Take-up Loading Arms

Supply/Take-up Loading Arms
4) Remove one (1) screw.
5) Release one (1) tab and remove the guide base clamp plate with the supply/take-up guide rollers assembled on it.
6) Release one (1) tab and remove the take-up loading arm.
7) Remove the supply loading arm.

13. Take-up Pulley and Clutch Gear Assembly (Fig. 7-13)

Take-up Pulley
1) Release the reel belt.
2) Remove the washer and pull out the take-up pulley.

Clutch Gear Assembly
3) Remove the cassette loading mechanism. (See item 1 in the section on cssette loading mechanism removal)
4) Remove the slider block assembly and reel drive idler. (See item 6)
5) Remove the reel belt in step 1) and remove three (3) screws.

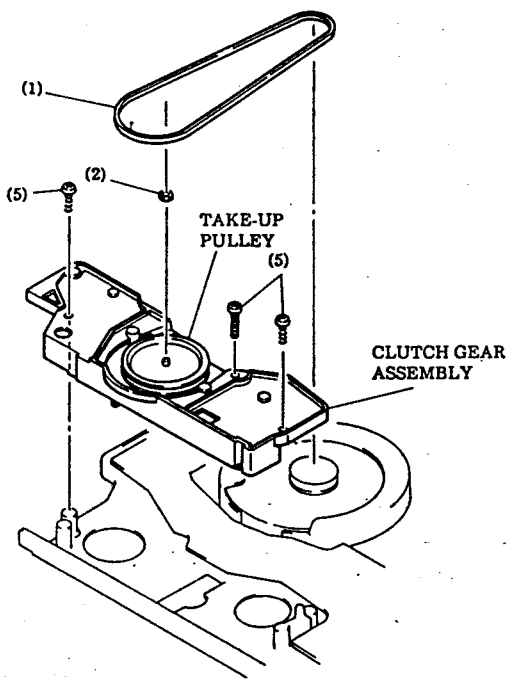


Fig. 7-13 Take-up Pulley and Clutch Gear Assembly

14. Take-up Gear, Change Arm, Change Gear, Relay Gear, FL Change Gear and FL Change Arm (Fig. 7-14)
1) Remove the cassette loading mechanism. (See item 1 in the section on cassette loading mechanism removal)
2) Remove the slider block assembly and reel drive idler. (See item 6)
3) Remove the clutch gear assembly. (See item 13)

Take-up Gear
4) Remove the washer and pull out the take-up ge

Change Arm, Change Gear
5) Remove the take-up gear.
6) Release one (1) tab and remove the spring hooke to the change arm.
7) Release two (2) tabs and remove the change arm
8) Remove the washer and pull out the change gea

Relay Gear
9) Release one (1) tab and pull out the relay gear.

FL Change Gear, FL Change Arm
10) Remove the cap, spring and washer and pull out the FL change gear.
11) Release two (2) tabs and remove the FL change lever.

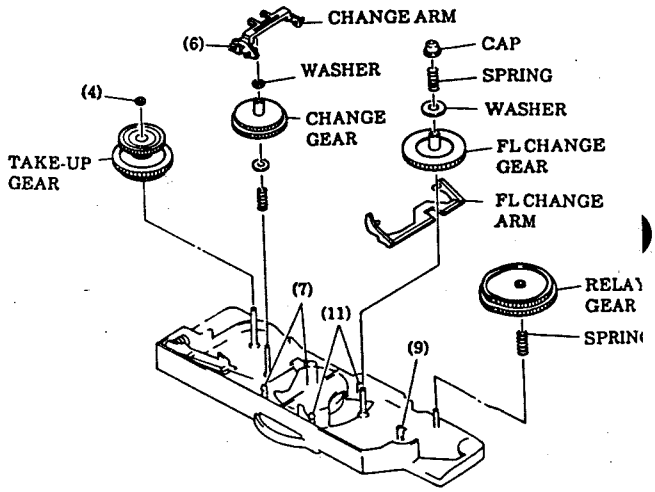


Fig. 7-14 Take-up Gear, Change Arm, Change Gear, Relay Gear, FL Change Gear and FL Chage Arm

ELECTRICAL CIRCUIT ADJUSTMENTS

Test equipment and tapes necessary for adjustment
1) Dual-trace oscilloscope
2) Colour bar generator (PAL/SECAM)
3) VTVM
4) Frequency counter
5) Monitor TV
6) Alignment tapes (PAL, SECAM)
7) Blank tape

Cautions on adjustments
1) If there are no special instructions, the following conditions apply:
   - ○ Oscilloscope probe: 10:1
   - ○ Oscilloscope synchronization: Auto-Sync
   - ○ Tracking control : Preset position* (Centre position)

   * To preset the tracking, press the tracking up and down buttons simultaneously.
2) When making more than one adjustment, make adjustments in the order listed.

Resetting microprocessors
Press the RESET switch (S719) on the timer / operation switch circuit board.

---

1. Adjust the parts on the main circuit board (SYSTEM CONTROL, SERVO, MOTOR DRIVE, AUDIO, JACK) Y/Chroma circuit board from the solder side as shown in Fig. 1.

Adjust the parts on the F.S tuning circuit board and OSD circuit board form the component side as shown in Fig.1.

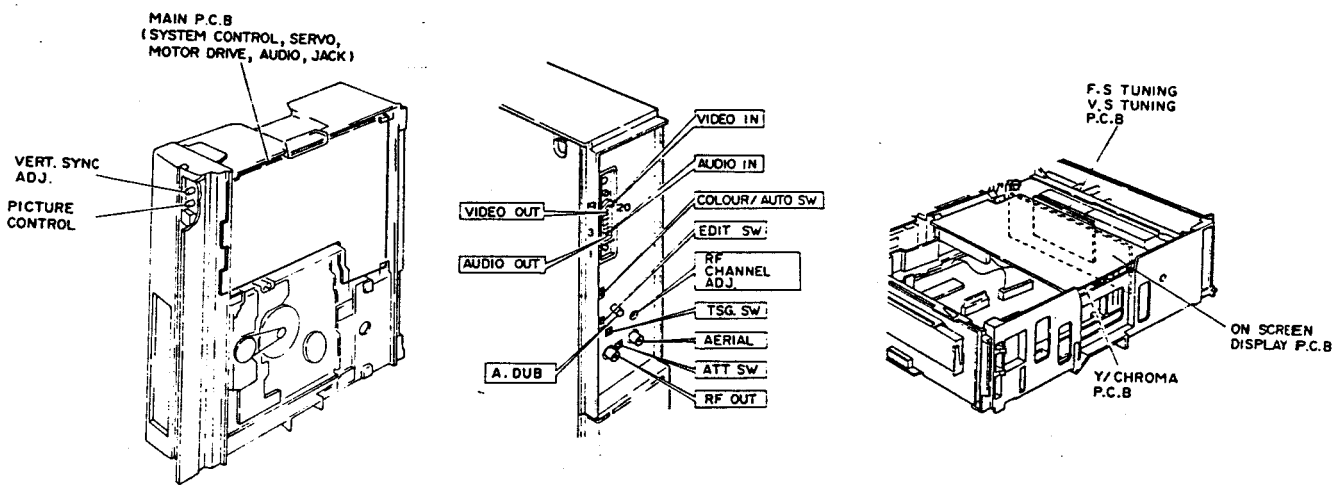
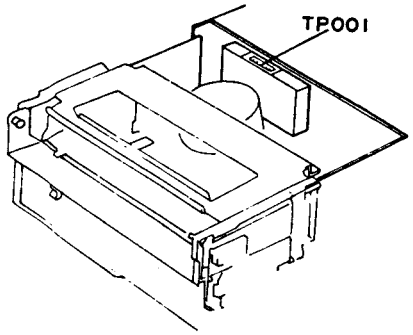


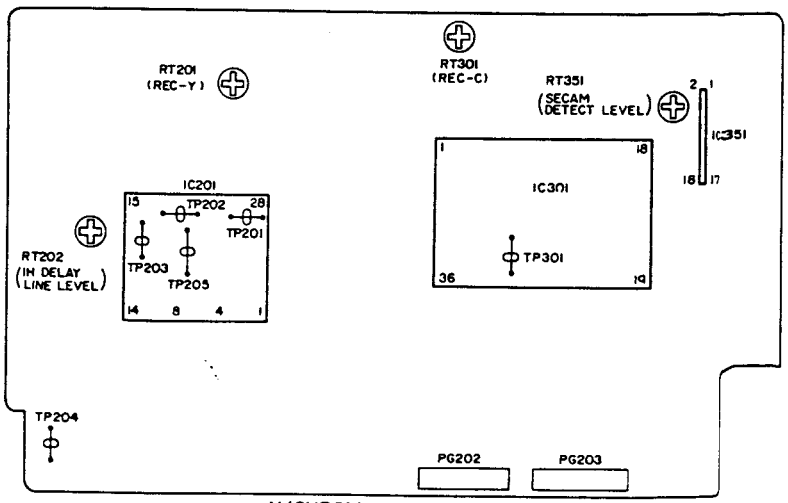
Fig. 1 Ready to Adjust Main Circuit Board, Y/Chroma Circuit Board, F.S Tuning Circuit Board and OSD Circuit Board

* See item 4 in chapter 2 on circuit board removal for details of circuit board removal.

ADJUSTMENT PARTS LOCATIONS



PRE – AMP CIRCUIT BOARD



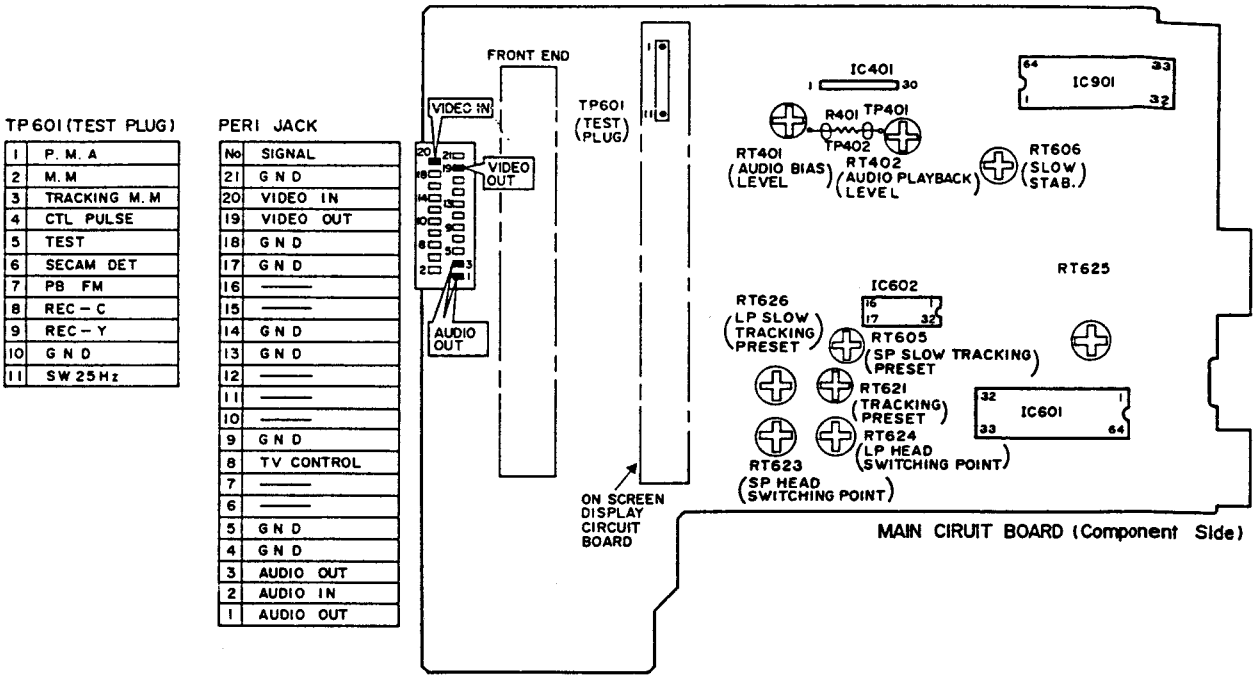
Y/CHROMA CIRCUIT BOARD (Solder Side)

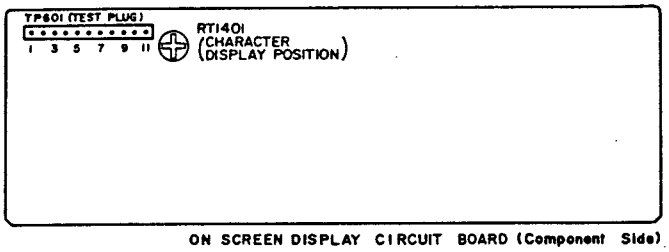
TP601 (TEST PLUG)

1	P. M. A
2	M. M
3	TRACKING M. M
4	CTL PULSE
5	TEST
6	SECAM DET
7	PB FM
8	REC – C
9	REC – Y
10	G N D
11	SW 25Hz

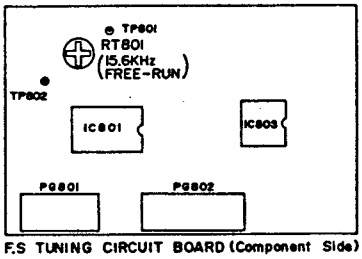
PERI JACK

No	SIGNAL
21	G N D
20	VIDEO IN
19	VIDEO OUT
18	G N D
17	G N D
16	——
15	——
14	G N D
13	G N D
12	——
11	——
10	——
9	G N D
8	TV CONTROL
7	——
6	——
5	G N D
4	G N D
3	AUDIO OUT
2	AUDIO IN
1	AUDIO OUT





ON SCREEN DISPLAY CIRCUIT BOARD (Component Side)



F.S TUNING CIRCUIT BOARD (Component Side)

1. SERVO CIRCUIT ADJUSTMENTS

1. Head Switching Point Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Set the video head switching point to almost the centre where the CH-1 and CH-2 envelopes overlap each other during playback

Fault: ○ The vertical sync signal is degraded and vertical jitter occurs.
○ Switching noise occurs in lower part of picture.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1:Video out • CH-2:TP601 pin 11 (SW25Hz)	• Playback alignment tape (Stairsteps) • Tracking Control : Preset position	• RT623
• Alignment tape			

Adjustment Procedure

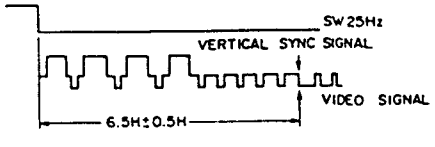
– Oscilloscope settings –
- Set sync slope switch "–"
- Trigger with CH-2

SP mode
6.5H ± 0.5H from trailing edge (trigger point) of SW 25 Hz pulse.

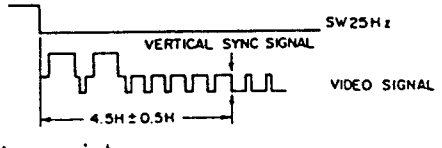
LP mode
Set the test mode (See page 4-9 in the section on connection diagram) 4.5H ± 0.5H from trailing edge (trigger point) of SW 25 pulse.

Waveforms

SP mode



LP mode (TEST mode)



Trigger point

2. Tracking Preset Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Optimize tracking when playing back a tape recorded by this unit.
Fault: ○ Noise occurs even with tracking centred.
○ Noise cannot be removed by adjusting the tracking.

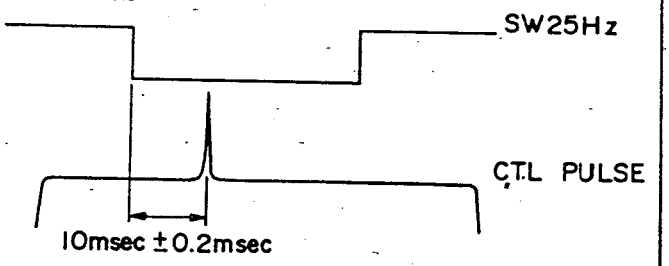
Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1: TP601 pin 4 (CTL PULSE) • CH-2: TP601 pin 11 (SW25Hz)	• Record colour bar signal in SP mode and play it back with this unit. • Tracking control: Preset position	• RT621
• Colour bar generator (or receive TV programme)	• Video in		
• Blank tape			

Adjustment Procedure

– Oscilloscope settings –
- Set sync slope switch to "–"
- Trigger with CH-2

It is 10 msec ± 0.2 msec from the fall of SW25Hz to the peak of CTL pulse.

Waveforms



3. Slow Tracking Preset Adjustment (For models with the slow play function)

Purpose of adjustment and fault occurring if incomplete
Purpose: Optimize tracking during slow play.
Fault: A noise bar appears in the picture during slow play.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1: TP601 pin 4 (CTL PULSE) • CH-2: TP601 pin 11 (SW25Hz)	• Record colour bar signal in SP mode and play it back with unit in slow mode. • Slow tracking: Preset position* * Press the RESET switch (S719) on the timer / operation switch circuit board.	• RT605 (SP mode) • RT626 (LP mode)
• Colour bar generator (or receive TV programme)	• Video in		
• Blank tape			

Adjustment Procedure

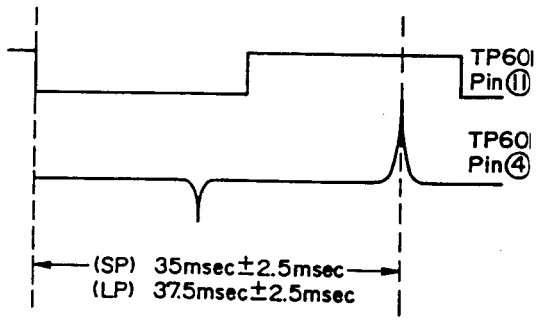
– Oscilloscope settings –
- Set sync slope switch to "–"
- Trigger with CH-2

SP mode (3 Heads model)
It is 35msec ± 2.5msec from the fall of SW25 Hz to the peak of CTL pulse.

SP mode (4 Heads model)
Turn RT605 so noise appears in the lower half of the TV picture. Move the noise further to the bottom and stop it at the bottom edge of the screen.

LP mode (4 Heads model)
It is 37.5msec ± 2.5msec from the fall of SW25 Hz to the peak of CTL pulse.

Waveforms



4. Slow Stability Adjustment (For models with the slow play function)

Purpose of adjustment and fault occurring if incomplete
Purpose: Suppress the horizontal jitter in the picture during slow play.
Fault: Horizontal jitter occurs in the picture during slow play.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Monitor TV (Note) • Colour bar generator (or receive TV programme) • Blank tape	• TP601 pin 1 • Video in	• Record colour bar signal in SP mode and play it back with this unit in slow mode. • Slow tracking : Preset position* * Press the RESET switch (S719) on the timer / operation switch circuit board.	• RT606

Adjustment Procedure
Minimize horizontal jitter in the picture.

Note: Use a TV with which horizontal jitter can be seen clearly or select a channel other than AV.

2. Y/CHROMA CIRCUIT ADJUSTMENTS

1. Rec Y/C Adjustment

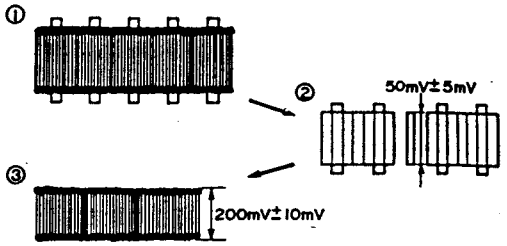
Purpose of adjustment and fault occurring if incomplete
Purpose: Set the Y/C record levels to the optimum values.
Fault: O Diamond beats occur in the played back picture or colouring becomes poor.
O The played back picture becomes dark and noise increases, or the picture glares and becomes whitish.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope • Colour bar generator (or receive TV programme) • Blank tape	• TP001 (on Pre-amp) • Video in	• REC mode	• RT301 (REC-C) • RT201 (REC-Y)

Adjustment Procedure

RT301 : Set RT201 to a minimum and adjust RT301 so the chroma record level is 50 mV ± 5mVp-p.
RT201 : Adjust RT201 so the record luminance level is 200 mV ± 10mVp-p.

Waveforms ①



2. 1H Delay Line Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: To operate the vertical processor normally.
Fault: O Random noise may be conspicuous.
O Dropout may not be compensated.

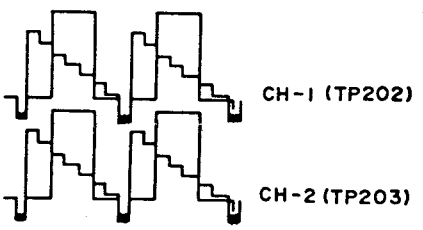
Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope • Alignment tape	• TP202 (IC201-pin 4) • TP203 (IC201-pin 8)	• Playback alignment tape (Colour bars)	• RT202

Adjustment Procedure

Adjust RT202 so the amplitudes of the waveforms at TP202 and TP203 are aligned.

$CH1 = CH2 \ {}^{+1}_{-10}$ mVp-p

Waveforms

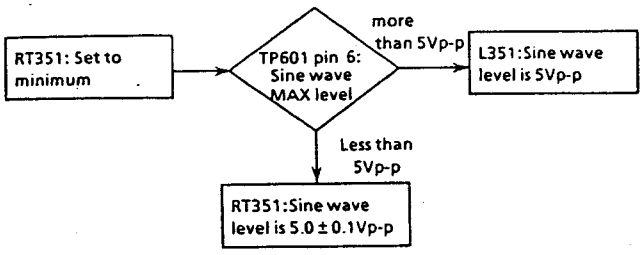


3. Secam Detect Level Adjustment

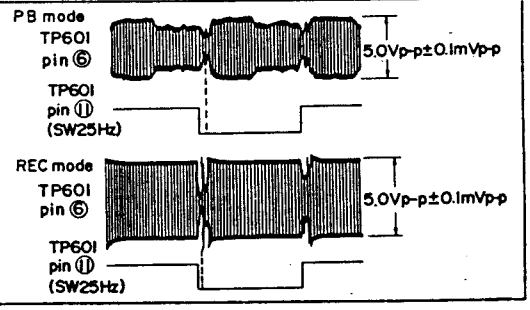
Purpose of adjustment and fault occurring if incomplete
Purpose: Set the Secam detect level to the specified value.
Fault: During automatic discrimination PAL and SECAM are discriminated incorrectly.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Oscilloscope	• CH-1 : TP601 pin 6 • CH-2 : TP601 pin 11 (SW25Hz)	• REC mode • Play back alignment tape (Colour bars)	• RT351
• SECAM colour bar generator	• Video in		
• Blank tape • Alignment tape (SECAM)			

Adjustment Procedure


RT351: Set to minimum
TP601 pin 6: Sine wave MAX level
more than 5Vp-p
L351:Sine wave level is 5Vp-p
Less than 5Vp-p
RT351:Sine wave level is 5.0±0.1Vp-p

Waveforms



3. AUDIO CIRCUIT ADJUSTMENTS

1. Audio Playback Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Set the audio playback level to the specified value.
Fault: When playing back a tape recorded by another VTR, the playback level does not match.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• VTVM	• Audio out	• Play back alignment tape (Colour bars)	• RT402
• Alignment tape			

Adjustment Procedure
The VTVM reads -3.8dBm±0.1dBm.

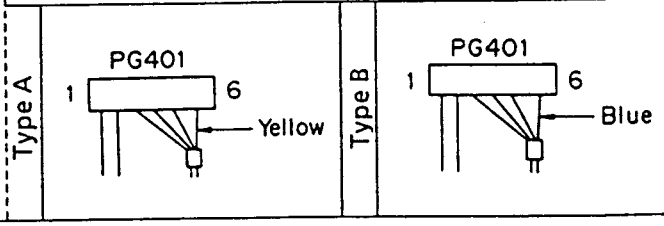
2. Audio Bias Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Set audio bias during recording to optimum level.
Fault: ○ Bias too high : High-frequency response deteriorates.
○ Bias too low : Sound tends to be distorted.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• VTVM	• TP401 (BIAS) • TP402 (BIAS GND)	• Non-signal recording	• RT401
• Blank tape			

Adjustment Procedure
The VTVM reads 2.1mV rms±0.1mV rms — Type A
2.6mV rms±0.1mV rms — Type B

Colour of Audio Head Connector Lead



4. ON SCREEN DISPLAY CIRCUIT ADJUSTMENT

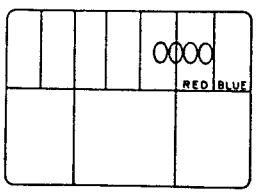
1. Character Display Position Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: To set the positions of characters displayed on the screen.
Fault : The on screen display position is drifted.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Monitor TV	• Video out	• E-E mode	• RT1401
• Colour bar generator (or receive TV programme)	• Video in		

Adjustment Procedure

o Display "0000" of the tape counter and adjust RT1401 so the right edge of one's place "0" is set to the border between red and blue.



5. F.S TUNING CIRCUIT ADJUSTMENT

1. 15.6kHz Free-Run Adjustment

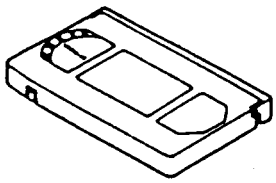
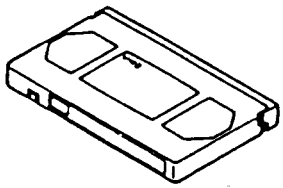
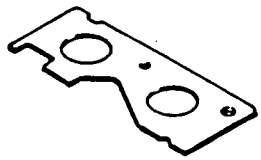
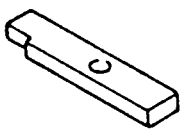
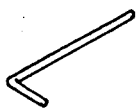
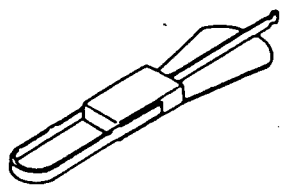
Purpose of adjustment and fault occurring if incomplete
Purpose: To set the free-run frequency applied to the SYNC detection circuit in the channel select circuit to 15.6kHz±0.1kHz.
Fault: The sync signal detection does not work and correct tuning is not performed.

Test Equipment / Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
• Frequency counter	• TP802 • TP801 (GND)	• Stop mode	• RT801 (15.6kHz FREE-RUN)

Adjustment Procedure
The counter reads 15.6kHz±0.1kHz

MECHANISM ADJUSTMENTS

JIGS AND TAPES FOR ADJUSTMENT

1. Back Tension Meter Parts No. 7099004 	2. Alignment Tape Parts No. 7099052 (PAL) 	3. Master Plane Parts No. 7099279 (S - VHS) 
4. Torque Gauge Parts No. 7099039 	5. Torque Gauge Adapter Parts No. 7099035 	6. Dummy Reel Parts No. 7099043
7. Reel Disk Height Jig Parts No. 7099038 	8. 1.5mm Hexagonal Wrench 0.9mm Hexagonal Wrench 	9. Fan-type Tension Gauge 

MECHANICAL PARTS ADJUSTMENT

1. Mechanism State Switch Adjustment

Purpose: To detect the mechanism state correctly and prevent malfunctions.

Test Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Blank tape	–	• Eject mode (With the cassette ejected)	• Mechanism state switch • Mode gear

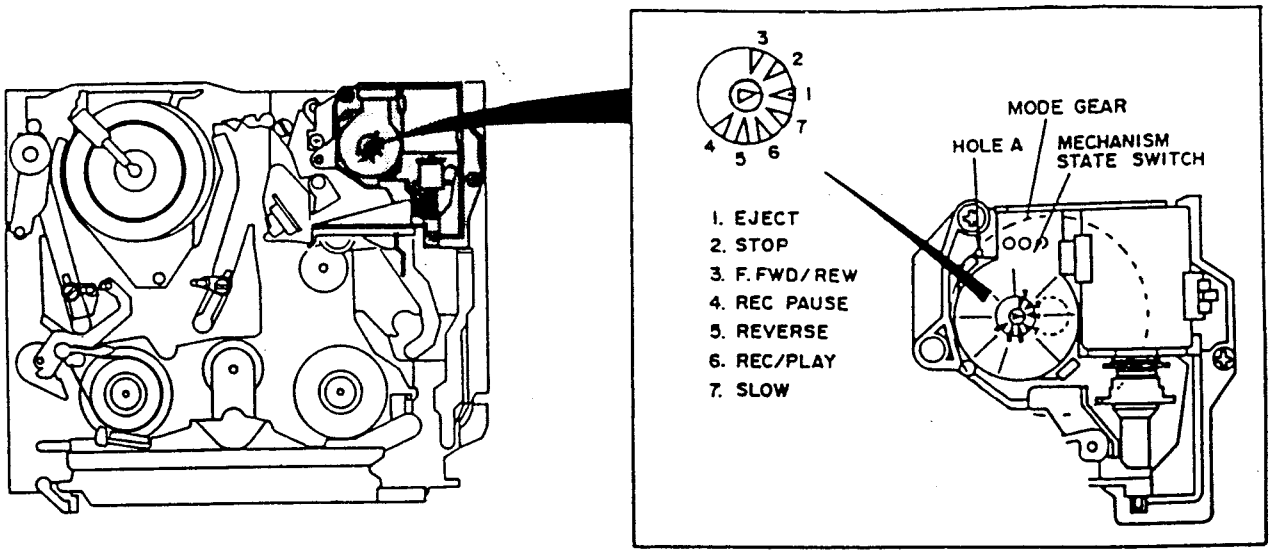
Adjustment procedure

1) Check that the arrow on the centre shaft of the mechanism state switch points to the arrow of mechanism mode indication number 1. Also check that hole (A) beside the mechanism state switch and the hole in the mode gear are aligned.

2) If the above alignments are not obtained, adjust as follows.
   1. Remove the mechanism state switch / loading motor assembly.
   (See "MAIN MECHANICAL COMPONENTS REMOVAL" in CHAPTER 2.)
   2. Move the mode gear to align the position of hole (A).
   3. Turn the gear on the back of the mechanism state switch so that the arrow on the centre shaft of the switch points to the arrow of mechanism mode indication number 1.
   4. Reinstall the mechanism state switch / loading motor assembly in the above condition.

3) Load a blank tape and perform various operations to check that loading and unloading are performed correctly.

Adjustment Diagram



TAPE TRANSPORT SYSTEM PARTS ADJUSTMENTS

The tape transport system is the path from the supply reel disk passing through the video heads to the take-up reel disk. The transport system parts, especially the parts which directly come into contact with a tape, should be kept clean without scratches, dust, oil, etc.

The tape transport system has been adjusted before the unit is shipped from the factory. Therefore, when parts in the transport system are replaced, the transport system is stabilized by only adjusting the new parts correctly.

1. Reel Disk Height Adjustment

Purpose: To set the reels of the cassette to the specified height, thus determining the height of tape.

Test Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Master Plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	–	• Spacers in the supply and take-up reel disks

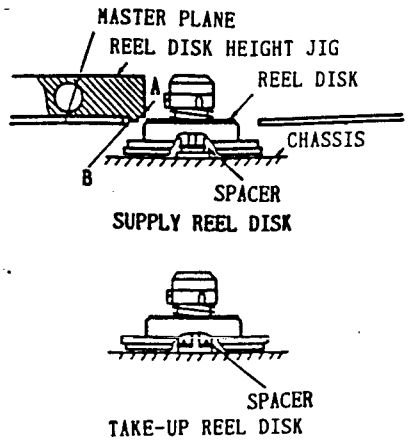
Adjustment procedure

1) Check that the reel disk is between sections A and B of the reel disk height jig.
2) If the disk is not between sections A and B of the jig, replace the spacers (0.5mm thick) in the reel disk or adjust them.

[Caution]

When the tension arm and tension band are removed, adjust the tension pole position and tension after reinstalling them.

Adjustment diagram



nsion Pole Position and Tension Adjustments

ose: To make the tension of tape constant so that the contact between the video heads and tape is stabilized.

st Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
tion adjustment –	–	1) Remove the top cover. 2) Operating the VTR without inserting a cassette tape (See page 4-9)	Position adjustment: • Tension band holder
ion adjustment nsion cassette arts No. 7099004)	–	Tension adjustment 3) Play the tension cassette	Tension adjustment: • Tension spring hooking position

ustment procedure

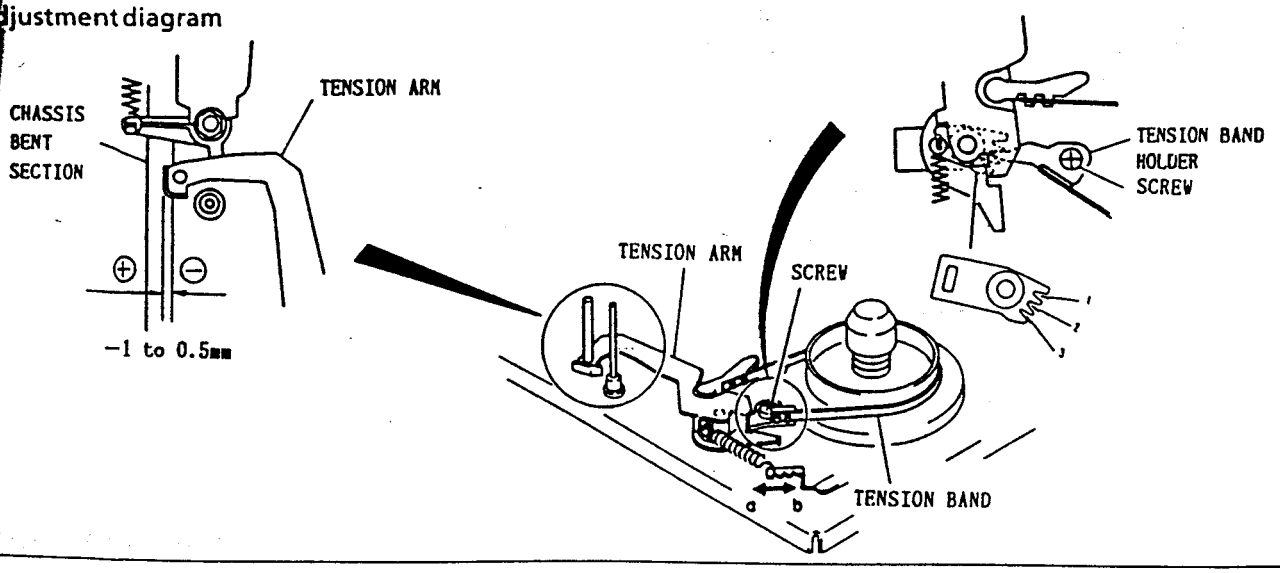
ition Adjustment -

Loosen the tension band retaining screw.
Insert the tension band holder into one of grooves 1 to 3 and set gap between the tension pole and chassis to -1 to 0.5 mm.
Tighten the tension band retaining screw.
After adjustment is completed, perform loading without inserting a cassette and recheck the tension pole position.

- Tension Adjustment -

Reading of tension cassette: 34~44 g-cm.
(reference value)
If the reading is higher than the reference, move the spring in direction (a).
If the reading is lower than the reference, move the spring in direction (b).
Caution: When the tension position is changed greatly (more than 6 g-cm), recheck the tension pole position. If it is drifted, readjust the tension pole position and tension.

djustment diagram



3. Guide Poles Height Adjustment

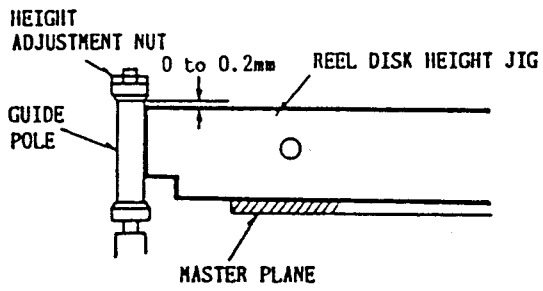
Purpose: To regulate the tape height.

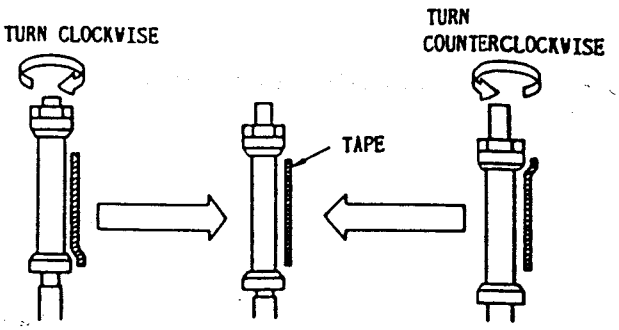
Test Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Master plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	–	• Nuts on the supply and take-up guide poles
• Blank tape	–	• Play mode	

Adjustment procedure

1) Set the clearance between the bottom of the guide pole's upper flange and top of the reel disk height jig is 0 to 0.2mm.
2) Load a blank tape to run it and check that the tape does not ride over the upper and lower flanges of the guide pole.
3) If the tape rides over either flange, adjust the height of guide pole as follows.
   If the tape rides over the upper flange, turn the nut counterclockwise.
   If the tape rides over the lower flange, turn the nut clockwise.

Adjustment diagram





4. Guide Rollers Height Adjustment

Purpose: To regulate the tape height so that bottom of tape runs along the tape guide line on the cylinder.

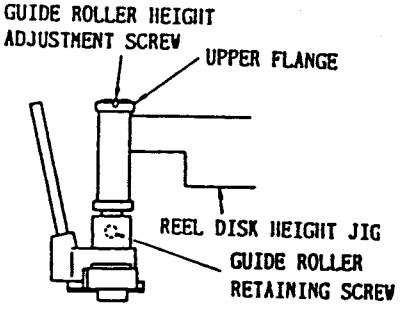
Coarse Adjustment

Test Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Master plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038) • 0.9mm hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	–	• Height adjustment screws on the supply and take-up guide rollers

Adjustment procedure

1) Loosen the guide roller retaining screw (so that the guide roller does not turn during loading, unloading and play).
2) Align the bottom of the guide roller's upper flange and the top of the reel disk height jig.
3) Perform the precise adjustment continuously.

Adjustment diagram



Precise Adjustment

Test Equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Oscilloscope	• CH-1 : TP601 pin 7 (PB FM) • CH-2 : TP601 pin 11 (SW 25Hz)	• Play alignment tape. (Colour bars)	• Guide roller height adjustment screws
• Alignment tape (Parts No. 7099052) • 0.9mm hexagonal wrench			

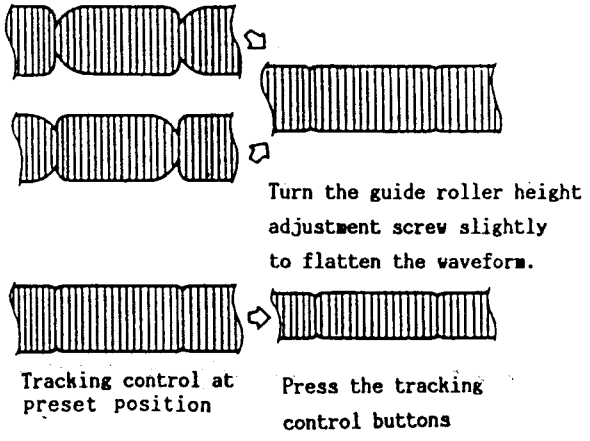
Connection diagram

See page 4-9 for the connection of test equipment.

Adjustment procedure

1) Tracking control (playback) : Preset position (When this adjustment is performed after the cylinder has been replaced, set the tracking control so that the FM output is maximum.)
2) Height adjustment screw : Flatten the FM waveform.
3) Press the tracking control up (▲) and down (▼) buttons.
4) Check that the FM drops at the start and end of FM envelope are uniform.
5) Tighten the guide roller retaining screw.

Waveforms


Turn the guide roller height adjustment screw slightly to flatten the waveform.
Tracking control at preset position
Press the tracking control buttons

5. Audio/Control (A/C) Head Adjustment

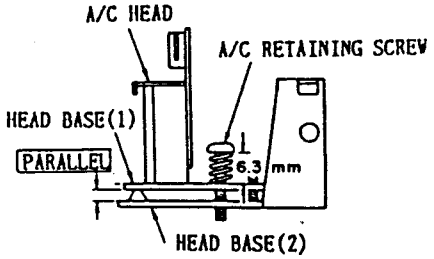
Purpose: To keep the contact between the tape and head even so the specified track is recorded and played back.

Coarse Adjustment

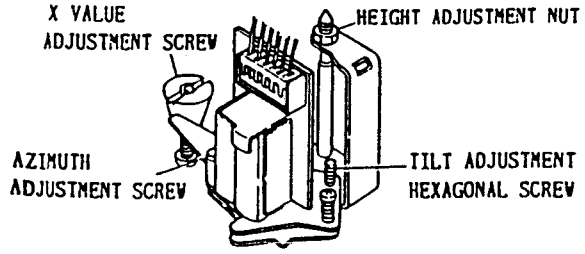
Test equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Master plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038) • 1.5mm hexagonal wrench	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	–	• A/C head retaining screw • Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Blank tape	–	• Run blank tape.	

Adjustment procedure/adjustment diagrams

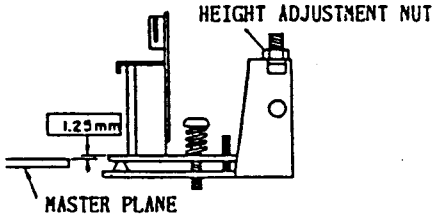
1) A/C head retaining screw : Check that the spring section of the A/C head retaining screw protrudes 6.3mm over the top of head base (1).



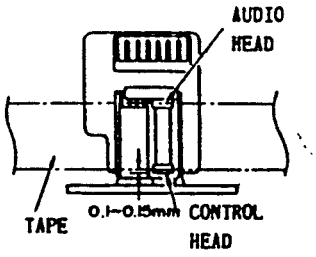
2) Tilt adjustment hexagonal screw/azimuth adjustment screw : Make head bases (1) and (2) parallel.



3) Height adjustment nut : Set the clearance between the master plane and head base (1) to approx 1.25mm.



4) Remove the adjustment jigs, load a blank tape and set the VTR to the play mode.
5) Check that there is no conspicuous curling and riding over around the A/C head. If there is conspicuous curling or riding over, readjust the tilt adjustment hexagonal screw, azimuth adjustment screw and height adjustment nut. When the bottom edge of tape is 0.1 to 0.15mm from the bottom edge of the control head's core, the height of A/C head is ideal.



6) Perform the precise adjustment continuously.

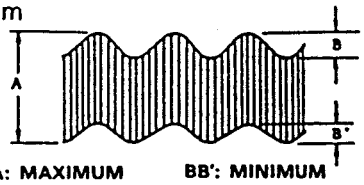
Precise Adjustment

Test equipment/Jigs	Test equipment connection point	State of VTR	Adjustment Point
• Oscilloscope	• Audio out	• Play alignment tape. (Stairsteps)	• Azimuth adjustment screw • Height adjustment nut • Tilt adjustment screw
• Alignment tape (Parts No.7099052) • 1.5mm hexagonal wrench			

Adjustment procedure

1) Adjust the azimuth adjustment screw, height adjustment nut and tilt adjustment hexagonal screw slightly, alternately : Make the audio output maximum and flat (minimum fluctuations).

Waveform diagram



6. X-Value Adjustment

Purpose: To obtain compatibility with other VTRs.

Note: Always perform the tracking preset adjustment (page 3-2) that should be done when the cylinder is replaced before adjusting the X-value.

Test equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Oscilloscope	• CH-1 : TP601 pin 7 (PB FM) • CH-2 : TP601 pin 11 (SW 25Hz)	• Play alignment tape. (Stairsteps)	• X-value adjustment screw
• Alignment tape (Parts No.7099052) • 1.5mm hexagonal wrench	—		

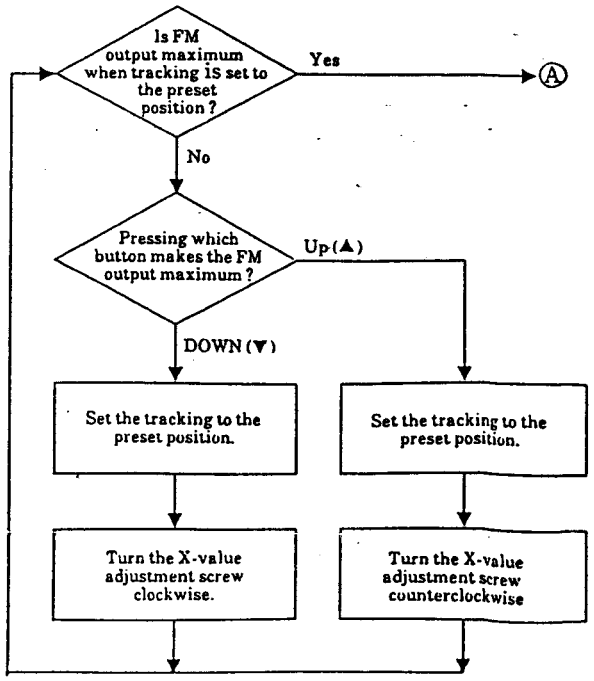
Connection Diagram

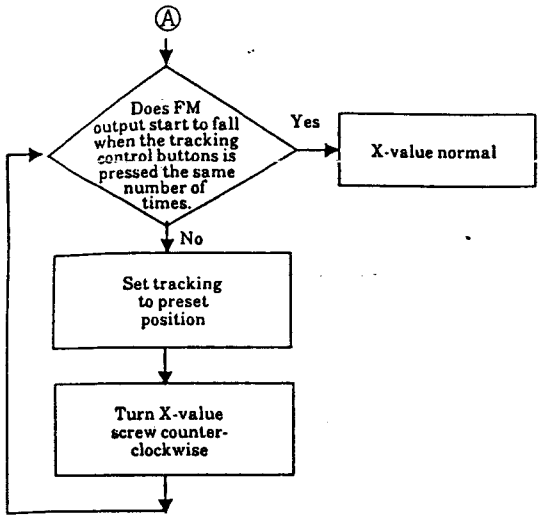
See page 4-9 for the connection of test equipment.

Adjustment Procedure

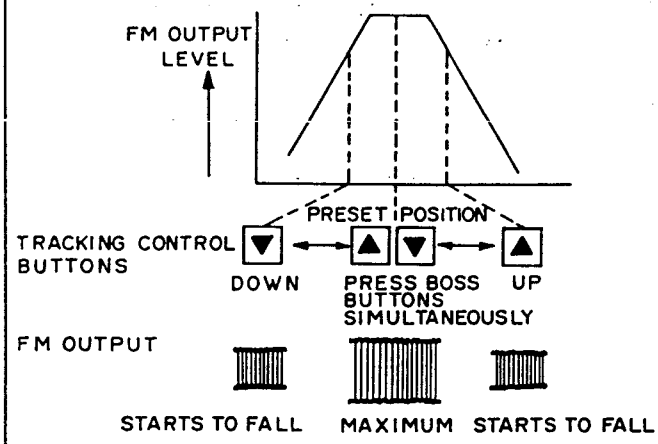
[Adjustment using PAL alignment tape]

Adjust so that the FM output is maximum when the tracking control is at preset position and it starts to fall when the tracking control buttons are presse the same number of times.


Is FM output maximum when tracking is set to the preset position?
Yes
A
No
Pressing which button makes the FM output maximum?
Up (▲)
DOWN (▼)
Set the tracking to the preset position.
Set the tracking to the preset position.
Turn the X-value adjustment screw clockwise.
Turn the X-value adjustment screw counterclockwise


Ⓐ
Does FM output start to fall when the tracking control buttons is pressed the same number of times.
Yes
X-value normal
No
Set tracking to preset position
Turn X-value screw counter-clockwise

Adjustment diagram

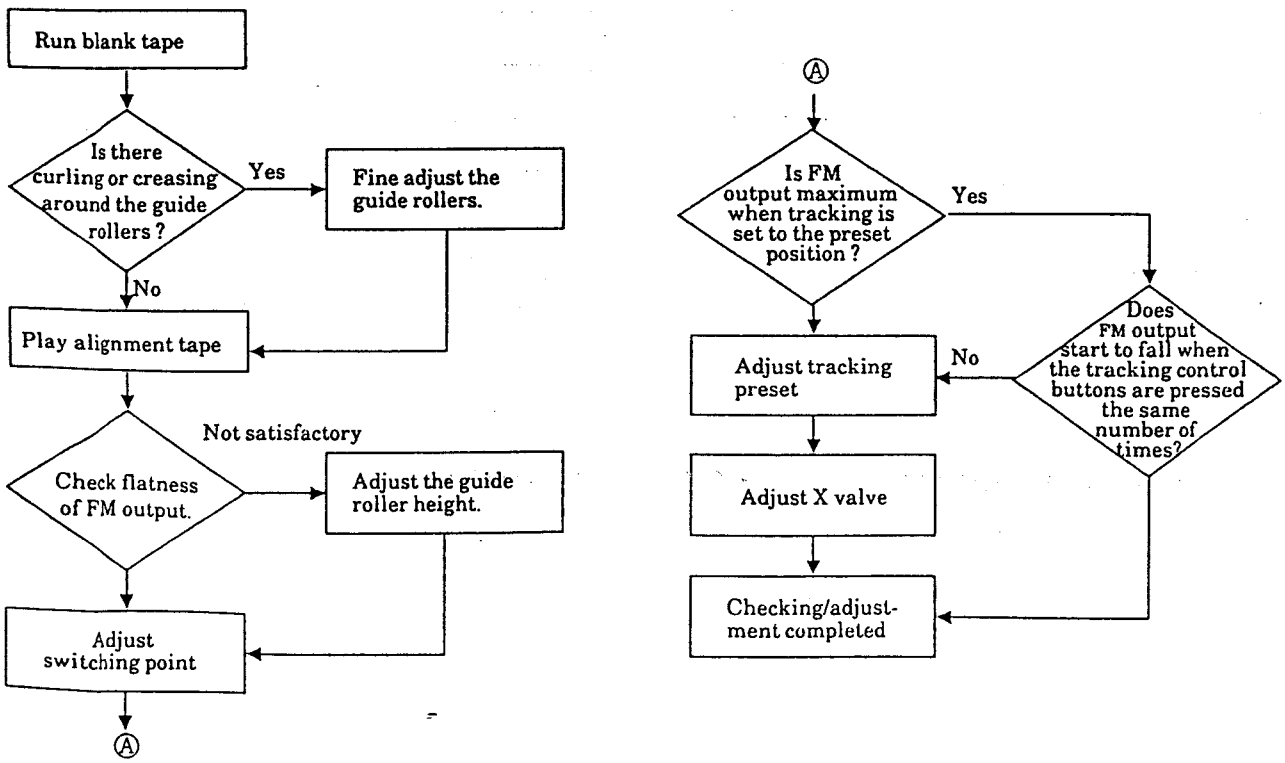


7. Adjustments After Replacing Cylinder (Video Heads)

Purpose: To suppress drift in the height relative to the guide roller and to minimize the X-value after replacing the cylinder.

Test equipment/Jigs	Preparation for adjustment	State of VTR	Adjustment Point
• Oscilloscope	Checking the flatness • CH-1: TP601 pin 7 (PB FM) • CH-2: TP601 pin 11 (SW 25Hz)	• Run the blank tape • Play alignment tape (Colour bars)	• Guide rollers (precise adjustment on page 4-4) • Head switching point (page 3-2) • Tracking preset (page 3-2) • X-value (page 4-6)
• Alignment tape (Parts No.7099052) • Blank tape • 0.9mm / 1.5mm hexagonal wrench • X-value adjustment screwdriver	—		

Check and Adjustment Procedures

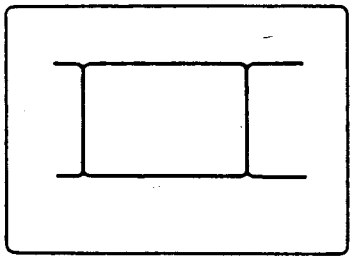

Run blank tape
Is there curling or creasing around the guide rollers ?
Yes
Fine adjust the guide rollers.
No
Play alignment tape
Not satisfactory
Check flatness of FM output.
Adjust the guide roller height.
Adjust switching point
Ⓐ
Ⓐ
Is FM output maximum when tracking is set to the preset position ?
Yes
Does FM output start to fall when the tracking control buttons are pressed the same number of times?
No
Adjust tracking preset
Adjust X valve
Checking/adjustment completed

Connection diagram

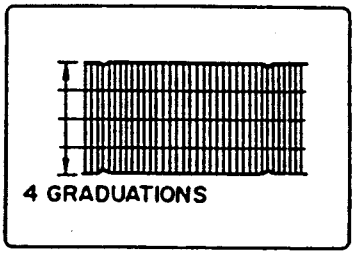
See page 4-9 for the connection of test equipment.

Checking procedure of the flatness and fluctuations of FM output and waveform diagrams

1) Use the tracking control buttons to maximize the FM output.

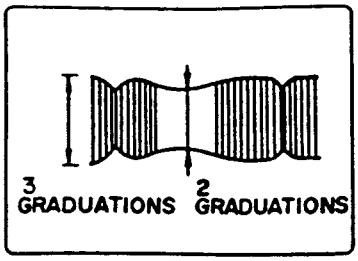


2) Fine tune the voltage level range of the oscilloscope to set the FM output to 4 graduations.



3) Press the tracking control buttons to set the maximum amplitude of the FM output to 3 graduations.

4) Check that the mimimum amplitude is more than 2 graduations.



5) Check that the level fluctuations between the maximum and minimum amplitudes are less than 13%.

8. Tension/Torque checks

Purpose: It is necessary to check the tension, torque and compression force at the tape take-up section and moving section to make the tape running smooth and satisfy the basic performance of the VTR. Check these if the tape running is not smooth or the tape speed is abnormal.

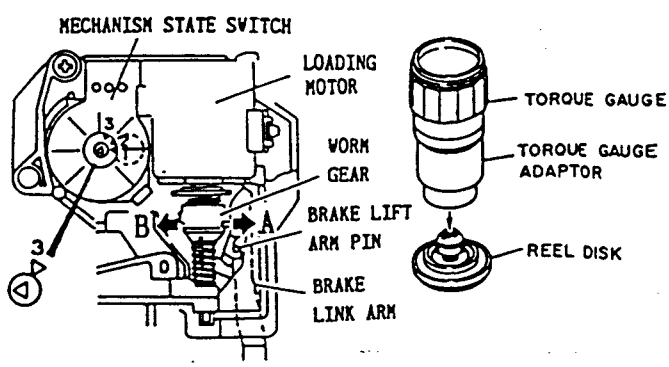
Test equipment/jigs		State of VTR	
• Torque gauge • Torque gauge adapter		• Operating the VTR without inserting a cassette tape.(See page 4-9)	
Item	VTR Operation mode	Measurement reel	Measurement values
Main brake torque	Stop (Note)	Supply and take-up reels	170g·cm or more
Slack removal torque	Unloading	Supply reel	90-230g·cm
Fast forward torque	Fast forward	Take-up reel	400g·cm or more
Rewind torque	Rewind	Supply reel	400g·cm or more
Take-up torque	Play	Take-up reel	80-170g·cm
Back-tension torque	Fast forward	Supply reel	4-25g·cm
	Rewind	Take-up reel	

Checking method

The values are measured using a torque gauge and torque gauge adapter with the torque gauge fixed.

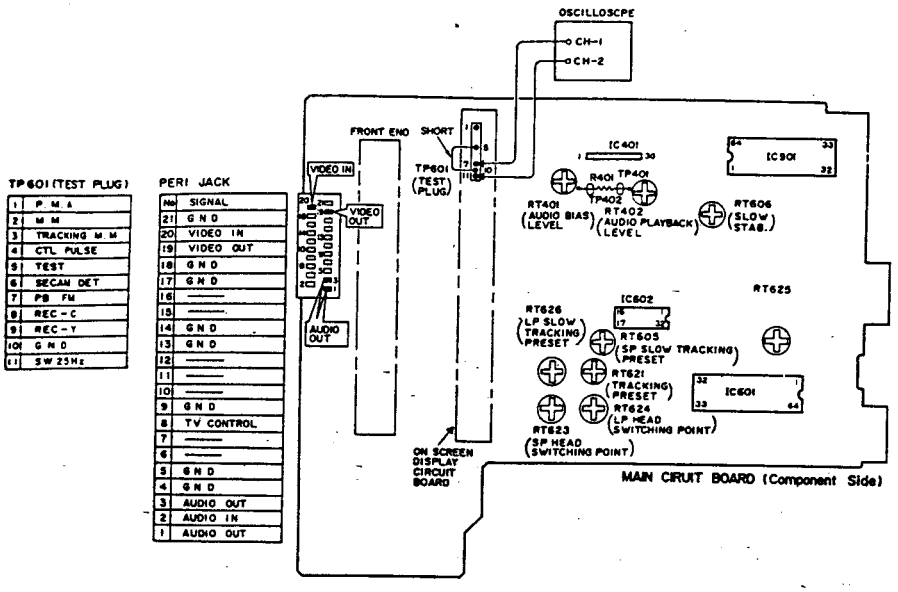
Note : Turn the worm gear in the direction of arrow (A) in the stop mode and shift the pointer on the mechanism state switch to "3" so as to apply the main brake to the supply reel disk. Then turn the worm gear in the direction of arrow (B) so that brake link arm is released from the brake lift arm pin (Set the reel drive idler to the centre position.)

Adjustment Diagram



9. Connection Diagram

Perform the following connections when adjusting the guide roller height (precise adjustment) and X-value and performing the adjustment after the cylinder (video heads) is replaced.



TP601 (TEST PLUG)	
1	P M A
2	M M
3	TRACKING M M
4	CTL PULSE
5	TEST
6	SECAM DET
7	PB FM
8	REC - C
9	REC - Y
10	G N D
11	SW 25Hz

No	SIGNAL
21	G N D
20	VIDEO IN
19	VIDEO OUT
18	G N D
17	G N D
16	——
15	——
14	G N D
13	G N D
12	——
11	——
10	——
9	G N D
8	TV CONTROL
7	——
6	——
5	G N D
4	G N D
3	AUDIO OUT
2	AUDIO IN
1	AUDIO OUT

Set the VTR to the loading state without inserting a cassette

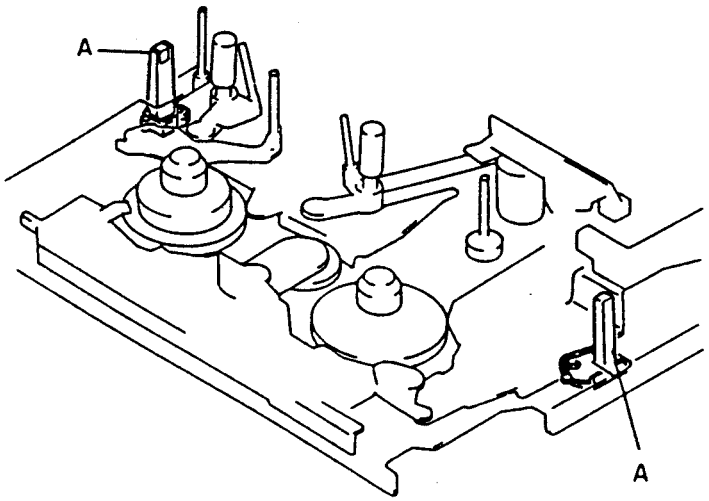
1) Remove the top cover and front panel.
2) Remove the cassette loading mechanism.
3) Unplug the mains lead from the AC outlet.
4) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light.
5) Plug the mains lead into the AC outlet.
6) Turn the VTR on.
   The VTR can accept the inputs of each mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reel disk in the stop state and reel pulses cannot be detected.

[Cautions]

Always return the VTR to the original state in the following order after the above operations have been performed.

1) Remove the masking tape, etc. from the supply and take-up reel end sensors.
2) Unplug the mains lead from the AC outlet to reset the system control microprocessor.

Adjustment diagram



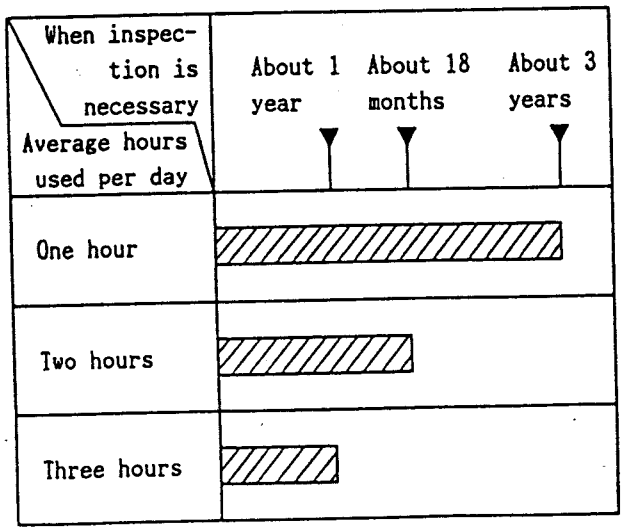
1. Required Maintenance

The recording density of a VTR is much higher than that of an audio tape recorder. VTR components must be very precise, at tolerances of 1/1000mm, to ensure compatible with other VTRs. If any of these components are worn or dirty, the symptoms will be the same as if the part is defective.To ensure good picture, periodic inspection and maintenance, including replacement of worn-out parts and lubrication, is necessary.

2. Scheduled Maintenance

Schedules for maintenance and inspection are not fixed because they vary greatly according to the way in which the customer uses the VTR, and the environment in which the VTR is used. But, in general home use, a good picture will be maintained if the inspection and maintenance is made every 1,000 hours. The table below shows the relation between time used and inspection period.

Table 1



3. Check before starting Repairs

The following faults can be remedied by cleaning and oiling. Check the need for lubrication and the conditions of cleanliness in the unit. Check with the customer to find out how often the unit is used. If from that, you determine that the unit is ready for inspection and maintenance, check the following parts.

Table 2

Phenomenon	Inspection Location
Poor S/N, no colour	Dirt on video head or worn video head
Tape does not run or tape is slack	Dirt on pressure roller, reel belt or flywheel belt
Vertical jitter, horizontal jitter	Dirt on video head or in tape transport system
Colour beats	Dirt on full-erase head
Low volume of sound distorted	Dirt on audio/control head
Fast forward or rewind is not done or rotation is slow	Dirt on reel belt

4. Tools Needed for Inspection and Maintenance

(1) Head cleaning kit
(2) VTR oil kit
(3) Alcohol (or freon)
(4) Gauze
(5) Screwdriver for adjusting X-value

Table 3 Locations for greasing and Oiling using the Kit

Name	Oil or Greasing Location
Pan motor oil (X10W40)	Oil high-speed rotating sections
Sonic Slidas Oil (#1600)	Oil low-speed rotating sections
Hitazol (M0138)	Grease metal parts under heavy load
Froil (GB-TS-1)	Lubricate metal or molded sections under light load
Lock paint	Fix adjustment screws

The above oils and greases are in the kit prepared especially for VTR maintenance. Use this kit for lubrication.

5. Maintenance Procedures

5-1. Cleaning

(1) Cleaning video head

First use a cleaning tape. If dirt on head is too stubborn to remove by tape, use the head cleaning kit. Coat the cleaning stick with cleaning fluid to the point indicated. Touch the stick to the head tip and gently turn the head (rotating cylinder) to the right and left.

(Do not move the stick vertically and make sure that only the buckskin on the stick comes into contact with the head. Otherwise, the head may be damaged.)

Thoroughly dry the head. Then test run a tape. If cleaning fluid remains on the video head, the tape may be damaged when it comes into contact with the head surface.

(2) Cleaning the tape transport system and drive system, etc.

Wipe with gauze wetted with alcohol or freon.

Note:

① The tape transport system is the system which comes into contact with the running tape. The drive system consists of those parts which run the tape.

② Make sure that during cleaning you do not touch the tape transport system with the tip of a screwdriver and that no force is applied to the system that would cause deforming.

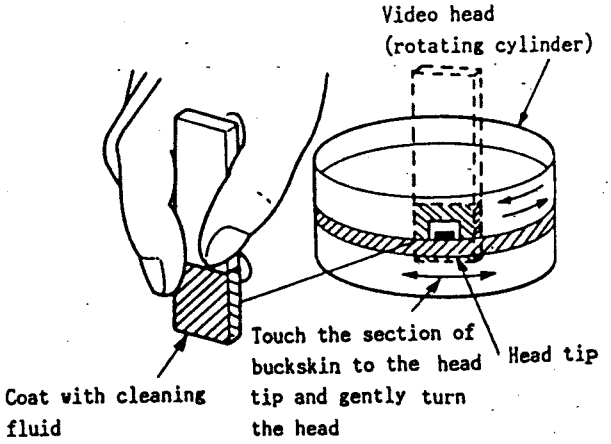
5-2. Lubrication

(1) Guidelines for lubricating with oil

Use the oiler to apply one or two drop of pan motor oil or Sonic Slidas oil. Make sure not to use too much oil because it may spill over or leak out coming in contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean with alcohol of freon.

(2) Periodic oil lubrication

Oil at specified locations every 1,000 hours.


Video head
(rotating cylinder)
Touch the section of buckskin to the head tip and gently turn the head
Head tip
Coat with cleaning fluid

5-3. Greasing

(1) Greasing guidelines

Apply grease, Hitazol or Froil, with a stick or brush. Do not use excess grease. It may come into contact with the tape transport or drive system. Wipe any excess and clean with gauze wetted in alcohol or freon.

(2) Periodic greasing

Grease specified locations every 5,000 hours.

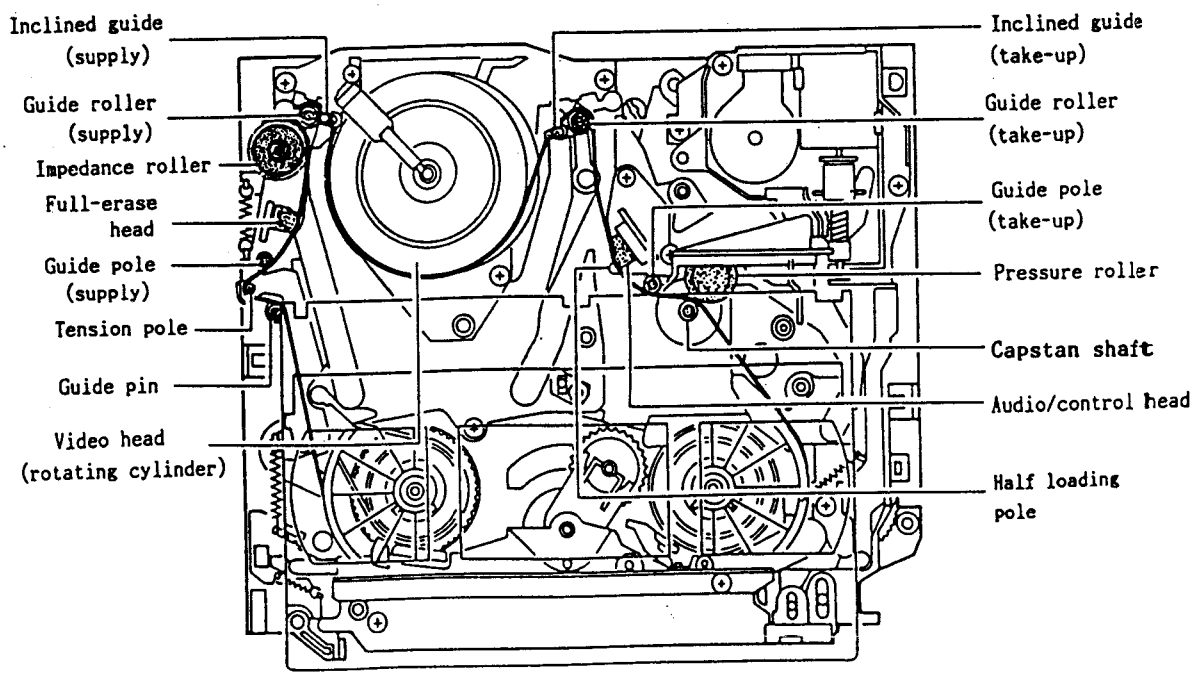


Fig.1 Tape Transport System

6. Inspection Locations

Phenomenon	Inspection Location	Replacement	①	②	③	④	⑤
Colour beats	Dirt on full-erase head		○				
Poor S/N, no colour	Dirt on video head			○			
Vertical jitter	Dirt on video head				○		
	Dirt in tape transport system				○		
Low volume, sound distorted	Dirt on audio/control head					○	
Tape does not run. Tape is slack.	Dirt on pressure roller						○

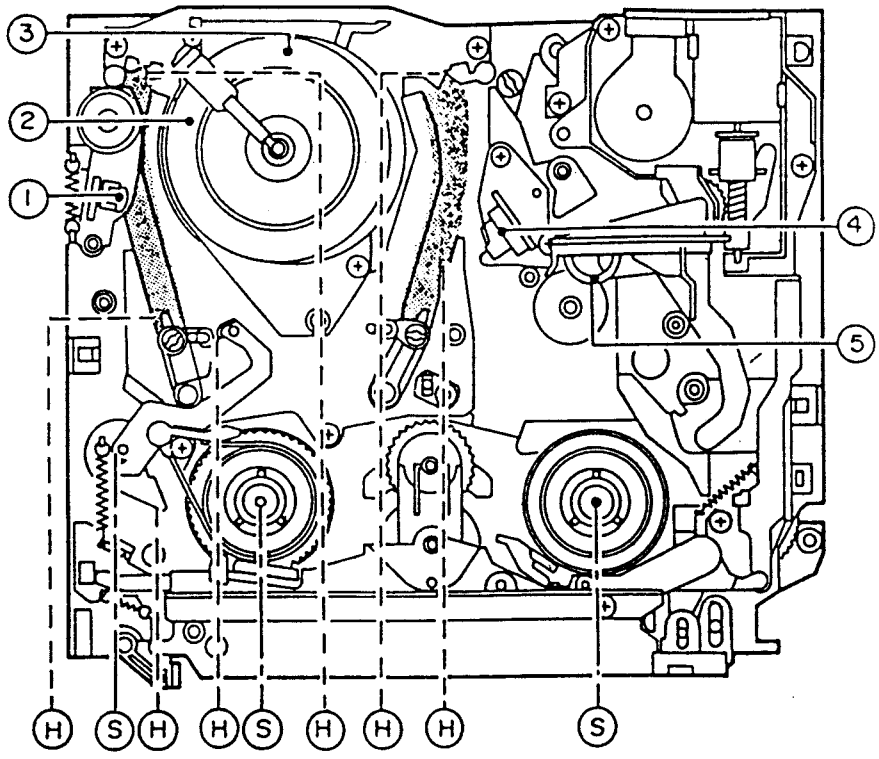


Fig. 2 Top View of Mechanism

Phenomenon	Inspection Location	Replacement
Do not fast forward or rewind, or rotation is slow	Dirt on reel belt	○
Tape does not run		
Slack tape		

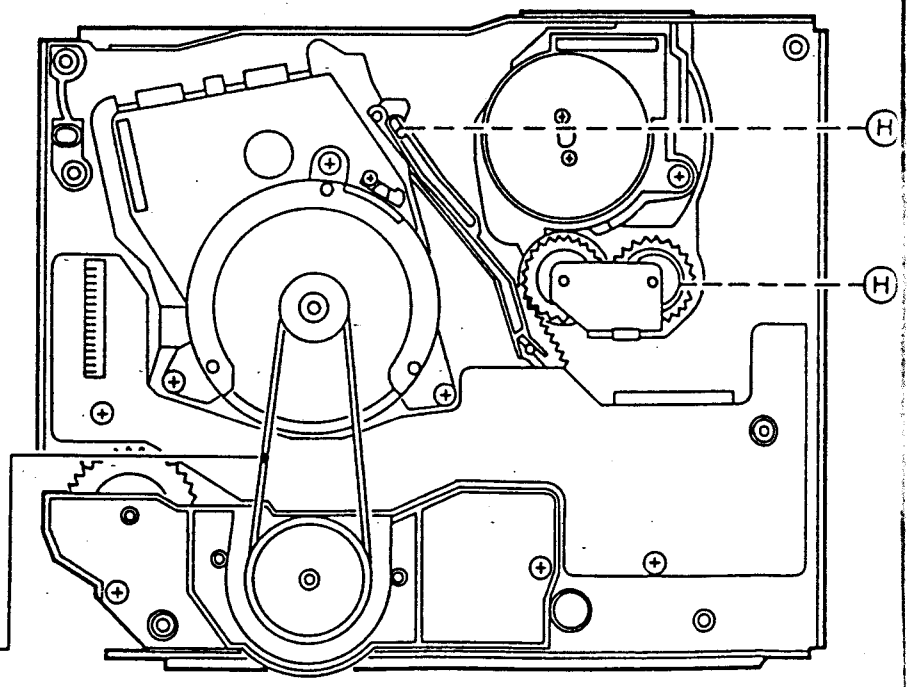


Fig.3 Bottom View of Mechanism

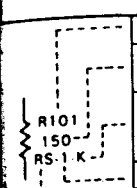
Note: If Locations marked with O do not operate normally after cleaning, they are worn. Replace.
See the EXPLODED VIEWS at the end of this manual as well as the above illustrations for the sections to be lubricated and greased.

Ⓢ: Sonic Slidas oil (oil locations)
Ⓗ: Hitazol (grease locations)

HEMATIC/CIRCUIT BOARD DIAGRAMS

Note

1 Voltage measured at base of chassis with minimum volume control and no signal
( ) are shown in recording condition
2 Nomenclature of Resistors and Capacitors



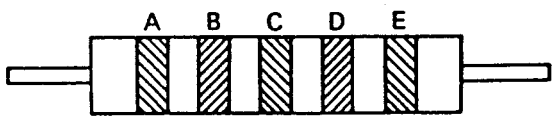
Circuit No		
Value	No indicated Ω (Ohm) M: 1000kΩ	
Tolerance	No indicated ± 5% K: ± 10% M: ± 20%	
Wattage	No indicated ¼ W	
Sort	No indicated Carbon film RC: Composition RW: Wire wound RS: Oxide metal film RN: Fixed metal film	

Circuit No.		
Value	No indicated μF P: PF	
Tolerance	No indicated ± 10% J: ± 5% M: ± 20% Z: + 80% – 20% D: ± 0.5pF C: ± 0.25pF	
Sort		Ceramic
		Electrolitic
	M	Mylar
	P	Polyester
	S	Styrol
Voltage	No indicated 50WV	

3 Be sure to make your orders of resistors and capacitors with value, voltage, tolerance and sort
4 When replacing capacitors marked With * use specified ones stated on parts list since required temperature characteristics

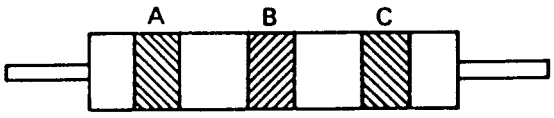
HOW TO READ CAPACITY AND INDUCTANCE OF RESISTOR-SHAPE CAPACITORS AND COILS

CAPACITOR



CAPACITY: (10A+B)xC [PF]
TOLERANCE: D
RATED VOLTAGE: BODY COLOR
Pink: 25V
Green: 50V
CHARACTERISTICS: E

COIL



INDUCTANCE: (10A+B)xC [μH]

COLOR	A, B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Grey	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

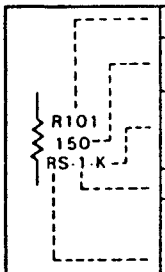
Cautions on use of MOS IC

1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
2. High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body, clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because of friction, so workers should be grounded.
4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

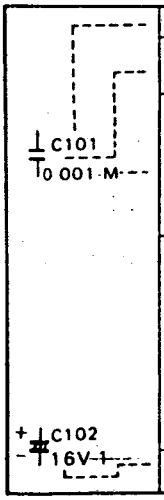
SCHALTPLAN/LEITERPLATTEN-DIAGRAMM

Hinweise:

1. Die aufgeführten Spannungswerte wurden bei auf Minimum gestelltem Lautstärkeregler und ohne Signal gemessen. Die in Klammern ( ) gestellten Werte gelten für den Aufnahmemodus.
2. Bezeichnung der Widerstände und Kondensatoren



Schaltkreis-Nr.	
Wert	Keine Angabe: Ohm M: 1000 kOhm
Toleranz	Keine Angabe: ± 5% K: ±10% M: ±20%
Wattzahl	Keine Angabe: 1/4W
Bauart	Keine Angabe: Kohlefilm RC: Verbundbauweise RW: Drahtspule RS: Metalloxidfilm RN: Fester Metallfilm

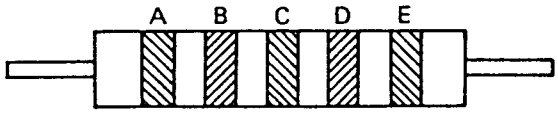


Schaltkreis-Nr.		
Wert	Keine Angabe: µF P : PF	
Toleranz	Keine Angabe: ±10% J : ± 5% M : ± 20% Z : + 80% 20% D : ± 0.5pF C : ± 0.25pF	
Bauart		Keramik
		Electrolyt
		Mylar
		Polyester
		Styrol
Spannung	Keine Angabe: 50V	

3. Bei der Bestellung von Widerständen und Kondensatoren unbedingt Wert, Spannung und Bauart angeben.
4. Werden die mit "*" markierten Kondensatoren ausgetauscht, dann müssen due in der Stückliste spezifizierten Kondensatoren verwendet werden, da diese spezielle Temperatureigenschaften aufweisen.

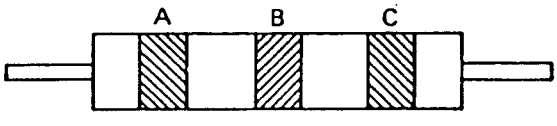
Ablesen der Kapazität und Induktivität der in Form von Widerständen ausgeführten Kondensatoren und Spulen

Kondensator



Kapazität: (10A+B)xC (pF)
Toleranz: D
Nennspannung: Farbe Rosa: 25V
Grün: 50V
Kennlinie: E

Spule



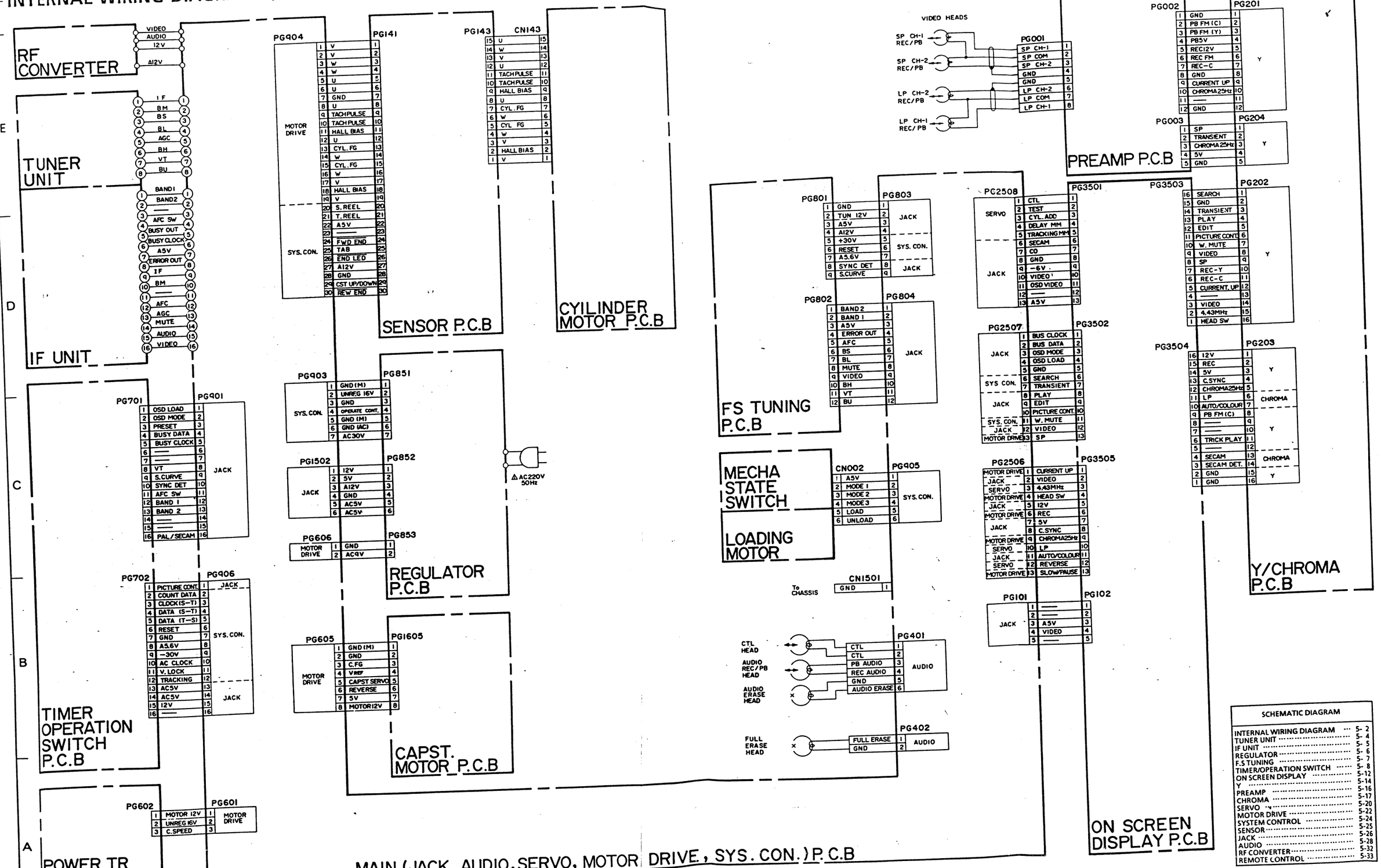
Induktivität: (10A+B)xC (µH)

Vorsichtsmaßnahmen bei der Verwendung von MOS-ICs

1. Die MOC-ICs werden für den Versand in schwarzen Schaumstoff verpackt. Dieser Schaumstoff ist elektrisch leitend und schließt die Leiter kurz, um Beschädigungen zu vermeiden. Die ICs während der Lagerung niemals aus der Schaumstoffverpackung entfernen. Die ICs nur unmittelbar vor der Verwendung auspacken und niemals auf Plastikteilen ablegen (statische Elektrizität!) bzw. Styrol-Schaumstoff einsetzen.
2. Aufgrund von Leckagen am Lötkolben kann es während des Lötens zu Hochspannungen kommen; daher immer die Spitze des Lötkolbens erden und nur einen Niederspannungs-Lötkolben verwenden.
3. Statische Elektrizität von einigen tausend Volt kann sich aufgrund von Reibung im menschlichen Körper bzw. in aus Kunstfasern hergestellten Kleidern und Handschuhen aufbauen. Daher sollten auch die mit der Handhabung von ICs betrauten Personen geerdet werden.
4. Unbedingt die für die Reparaturen verwendeten Meßinstrumente wie Oszilloskop, Röhrenvoltmeter usw. erden.

Farbe	A, B	C	D	E
Schwarz	0	10^0	±20%	Für Temperatur-Kompensation
Braun	1	10^1		
Rot	2	10^2		
Orange	3	10^3		
Gelb	4	10^4		
Grün	5	10^5		
Blau	6			
Violett	7			
Grau	8		±30%	Bauart mit hoher Dielektrizitätskonstanter
Weiß	9			Für Temperatur-Kompensation
Gold		10^{-1}	± 5%	
Silber		10^{-2}	±10%	Bauart mit hoher Dielektrizitätskonstanter

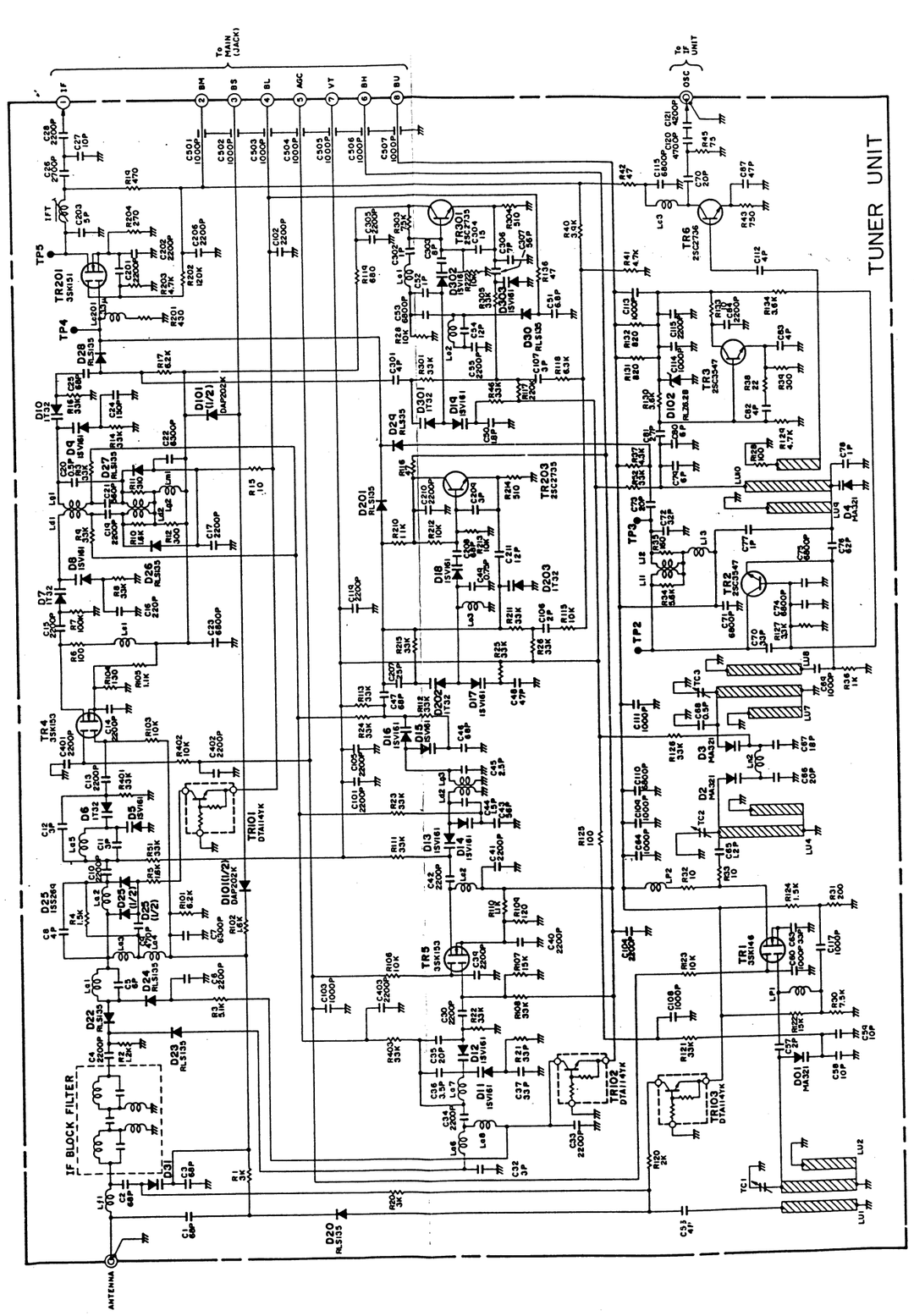
INTERNAL WIRING DIAGRAM (KABEANSCHUSSDIAGRAMM)



SCHEMATIC DIAGRAM

INTERNAL WIRING DIAGRAM ··· 5- 2
TUNER UNIT ··· 5- 4
IF UNIT ··· 5- 5
REGULATOR ··· 5- 6
F.S TUNING ··· 5- 7
TIMER/OPERATION SWITCH ··· 5- 8
ON SCREEN DISPLAY ··· 5-12
Y ··· 5-14
PREAMP ··· 5-16
CHROMA ··· 5-17
SERVO ··· 5-20
MOTOR DRIVE ··· 5-22
SYSTEM CONTROL ··· 5-24
SENSOR ··· 5-25
JACK ··· 5-26
AUDIO ··· 5-28
RF CONVERTER ··· 5-32
REMOTE CONTROL ··· 5-33

TUNER UNIT (TUNER-EINHEIT)


TUNER UNIT
To MAIN (JACK)
To IF UNIT
IF
BM
BS
BL
AGC
VT
BH
BU
OSC
ANTENNA
IF BLOCK FILTER
TR201 3SK151
TR4 3SK103
TRIO1 DTA114YK
TRIO2 DTA114YK
TRIO3 DTA114YK
TR5 3SK103
TR1 3SK146
TR2 2SC3547
TR3 2SC3547
TR6 2SC2736
TR203 2SC2735
TR301 2SC3547
TR302 2SC3547
D101 (1/2) DAP202K
D102 RLS135
D201 RLS105
D202 1732
D203 1732
D301 1732
D302 1SV161
D303 1SV161
D1 MA321
D2 MA321
D3 MA321
D4 1SV161
D5 1SV161
D6 1732
D7 1732
D8 1SV161
D9 1SV161
D10 1732
D11 1SV161
D12 1SV161
D13 1SV161
D14 1SV161
D15 1SV161
D16 1SV161
D17 1SV161
D18 1SV161
D19 1SV161
D20 RLS135
D21 RLS135
D22 RLS135
D23 RLS135
D24 RLS135
D25 1S2466
D26 RLS135
D27 RLS135
D28 RLS135
D29 RLS135
D30 RLS135
D31
D101 MA321
D102 RLS135
D201 RLS105
D202 1732
D203 1732
D301 1732
D302 1SV161
D303 1SV161
D1 MA321
D2 MA321
D3 MA321
D4 1SV161
D5 1SV161
D6 1732
D7 1732
D8 1SV161
D9 1SV161
D10 1732
D11 1SV161
D12 1SV161
D13 1SV161
D14 1SV161
D15 1SV161
D16 1SV161
D17 1SV161
D18 1SV161
D19 1SV161
D20 RLS135
D21 RLS135
D22 RLS135
D23 RLS135
D24 RLS135
D25 1S2466
D26 RLS135
D27 RLS135
D28 RLS135
D29 RLS135
D30 RLS135
D31
TP1
TP2
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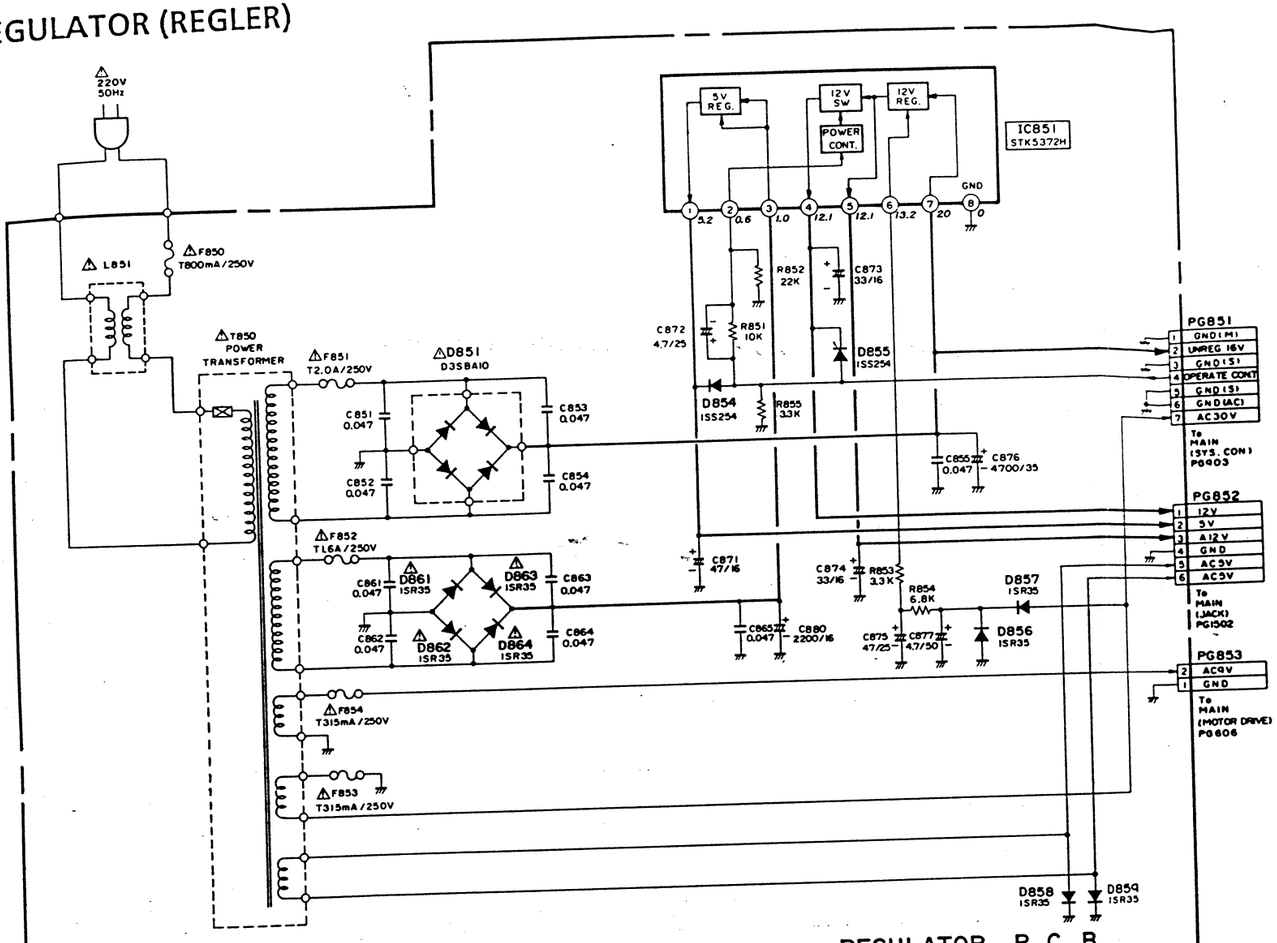
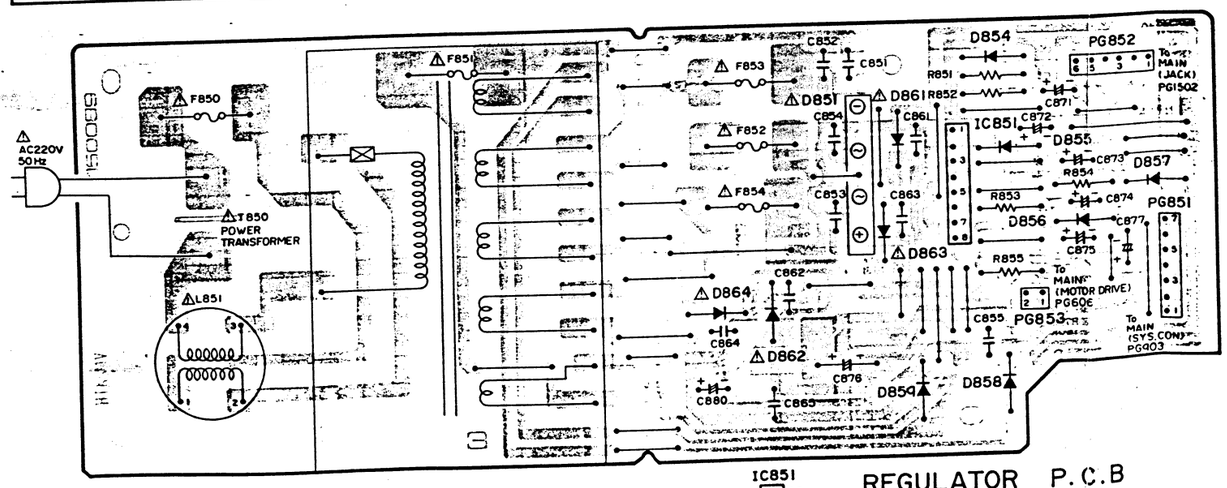
REGULATOR (REGLER)



REGULATOR P. C. B

* ONE VOLTAGE : PB OR REC MODE.



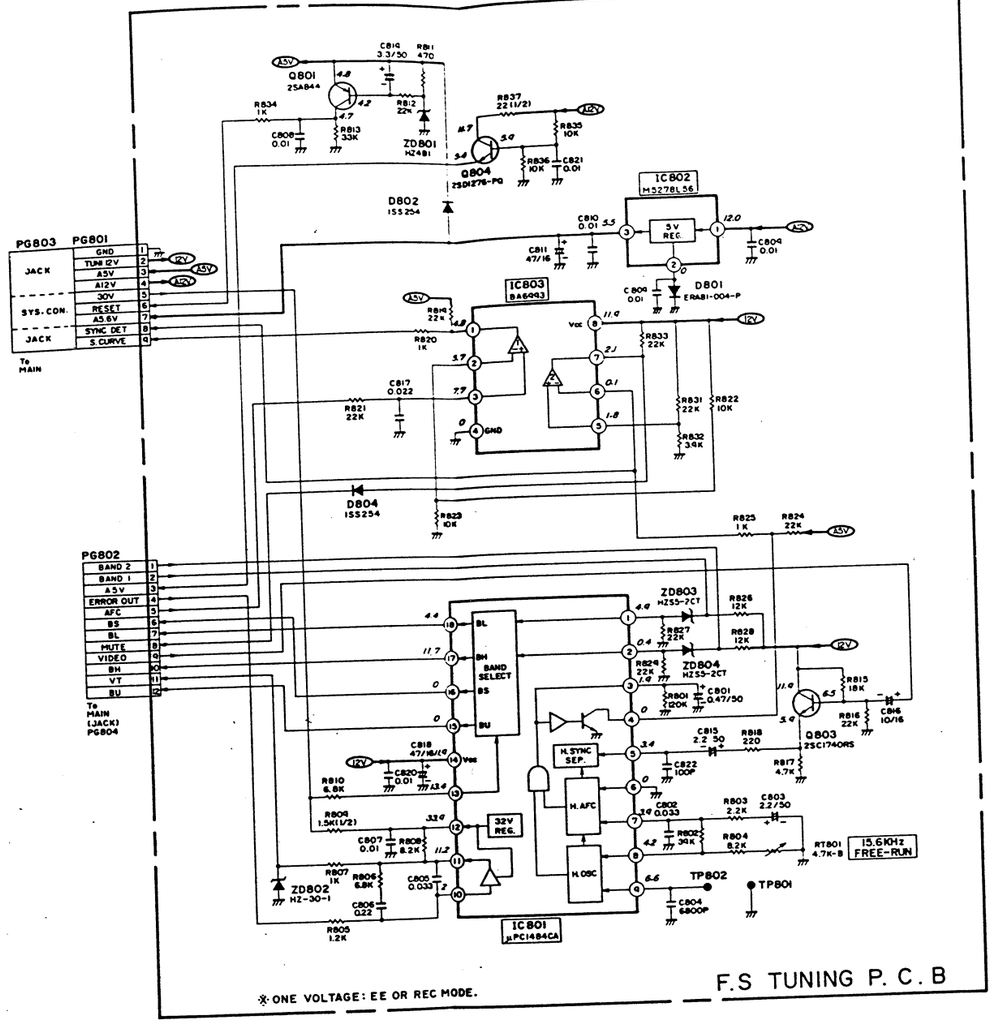
REGULATOR P.C.B

* ONE VOLTAGE: PB OR REC MODE.

IC851

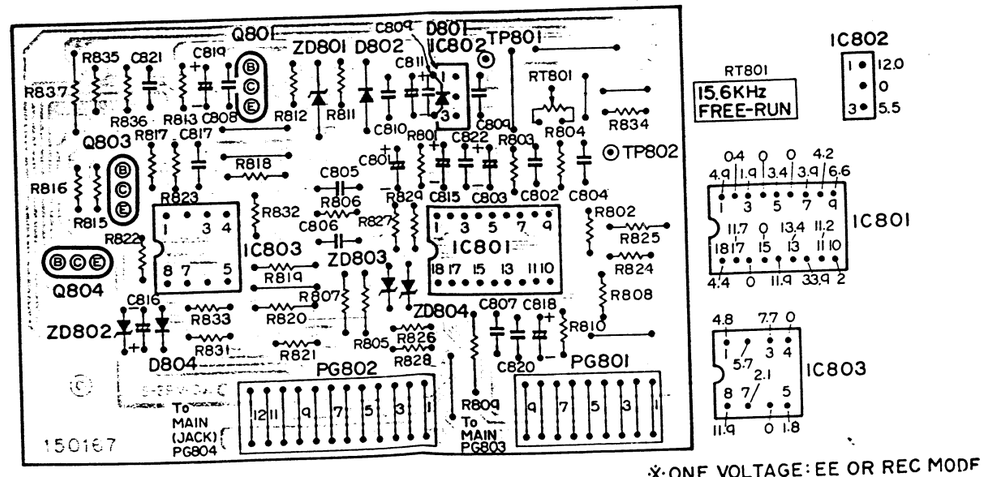
1	5.2
2	0.6
3	1.0
4	12.1
5	12.1
6	13.2
7	20
8	0

F.S TUNING (FREQUENZ-SYNTHESIZER-TUNER)



F.S TUNING P. C. B

※ ONE VOLTAGE: EE OR REC MODE.



F.S TUNING P.C.B

※ ONE VOLTAGE: EE OR REC MODE

IC802

1	12.0
2	0
3	5.5

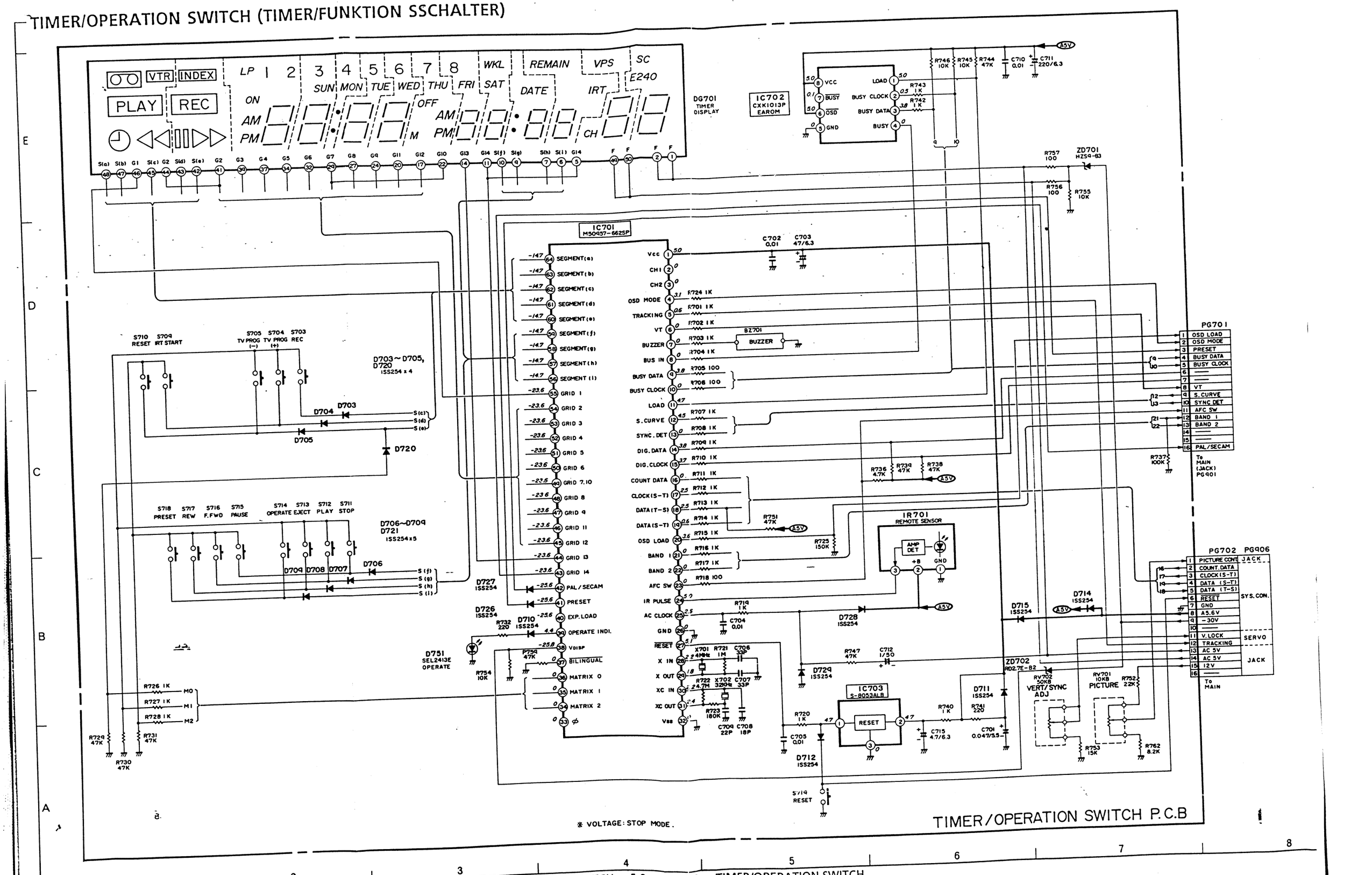
IC801

0.4	0	0	4.2							
4.9	1.9	3.4	3.9	6.6						
1	3	5	7	9						
11.7	0	13.4	11.2							
18	17	15	13	11	10					
4.4	0	11.9	33.9	2						

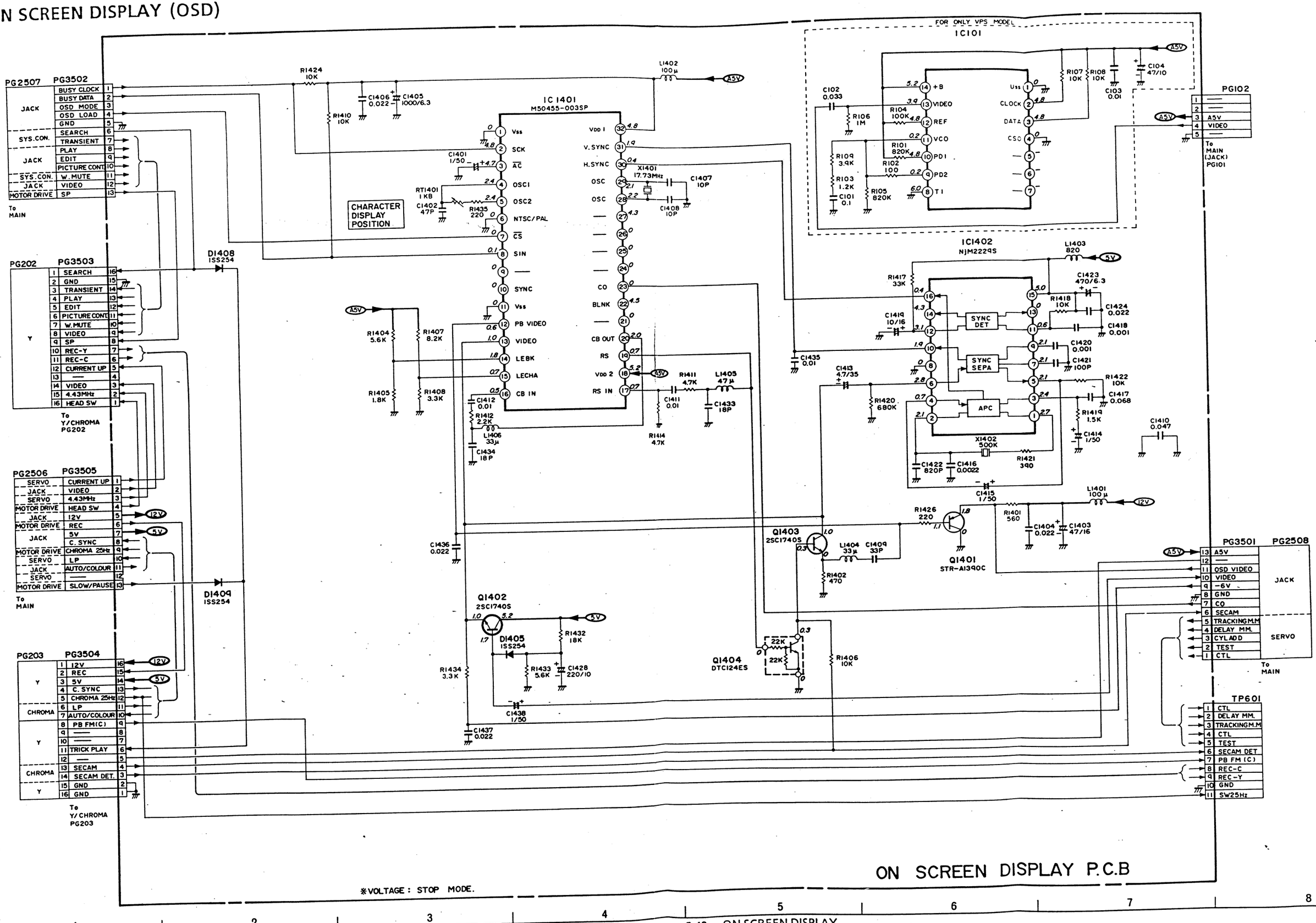
IC803

4.8	7.7	0						
1	3	4						
5.7	2.1							
8	7	5						
11.9	0	1.8						

TIMER/OPERATION SWITCH (TIMER/FUNKTION SSCHALTER)


VTR INDEX
PLAY REC
LP 1 2 3 4 5 6 7 8 WKL REMAIN VPS SC
SUN MON TUE WED THU FRI SAT DATE IRT E240
ON OFF
AM PM M AM PM CH
DG701 TIMER DISPLAY
IC702 CX K1013P EAROM
VCC BUSY OSD GND LOAD BUSY CLOCK BUSY DATA BUSY
R746 10K R745 10K R744 47K C710 0.01 C711 220/6.3 A5V
R743 1K R742 1K
R737 100 ZD701 HZS9-B3 R756 100 R755 10K
IC701 M50457-662SP
SEGMENT(a) SEGMENT(b) SEGMENT(c) SEGMENT(d) SEGMENT(e) SEGMENT(f) SEGMENT(g) SEGMENT(h) SEGMENT(i)
GRID 1 GRID 2 GRID 3 GRID 4 GRID 5 GRID 6 GRID 7,10 GRID 8 GRID 9 GRID 11 GRID 12 GRID 13 GRID 14
PAL/SECAM PRESET EXP.LOAD OPERATE INDI. VDISP BILINGUAL MATRIX 0 MATRIX 1 MATRIX 2 φ
Vcc CH1 CH2 OSD MODE TRACKING VT BUZZER BUS IN BUSY DATA BUSY CLOCK LOAD S.CURVE SYNC.DET DIG.DATA DIG.CLOCK COUNT DATA CLOCK(S-T) DATA(T-S) DATA(S-T) OSD LOAD BAND 1 BAND 2 AFC SW IR PULSE AC CLOCK GND RESET X IN X OUT XC IN XC OUT Vss
C702 0.01 C703 47/6.3
R724 1K R701 1K R702 1K R703 1K R704 1K R705 100 R706 100 R707 1K R708 1K R709 1K R710 1K R711 1K R712 1K R713 1K R714 1K R715 1K R716 1K R717 1K R718 100 R719 1K C704 0.01
X701 4MHz R721 1M C706 33P X702 32KHz C707 33P R722 4.7M R723 180K C709 22P C708 18P
BZ701 BUZZER
R751 47K R723 150K
IR701 REMOTE SENSOR AMP DET +B GND
D714 ISS254 D715 ISS254 D728 ISS254 D729 ISS254 D711 ISS254 D712 ISS254
R747 47K C712 1/50
IC703 S-8053ALB RESET
R720 1K C705 0.01 R740 1K R741 220 C715 4.7/6.3 C701 0.047/35
R736 4.7K R739 47K R738 47K
ZD702 RD2.7E-B2
RV702 50KB VERT/SYNC ADJ
RV701 10KB PICTURE
R752 22K R753 15K R762 8.2K R737 100K
PG701
1 OSD LOAD
2 OSD MODE
3 PRESET
4 BUSY DATA
5 BUSY CLOCK
6 ——
7 ——
8 VT
9 S.CURVE
10 SYNC DET
11 AFC SW
12 BAND 1
13 BAND 2
14 ——
15 ——
16 PAL/SECAM
To MAIN (JACK) PG901
PG702 PG906
1 PICTURE CONT
2 COUNT.DATA
3 CLOCK(S-T)
4 DATA (S-T)
5 DATA (T-S)
6 RESET
7 GND
8 A5.6V
9 −30V
10 ——
11 V.LOCK
12 TRACKING
13 AC 5V
14 AC 5V
15 12V
16 ——
JACK SYS.CON. SERVO JACK
To MAIN
S710 RESET S709 IRT START
S705 TV PROG (−) S704 TV PROG (+) S703 REC
D703~D705, D720 ISS254 x 4
D704 D703 D705 D720
S(c) S(d) S(e)
S718 PRESET S717 REW S716 F.FWD S715 PAUSE
S714 OPERATE S713 EJECT S712 PLAY S711 STOP
D706~D709 D721 ISS254x5
D709 D708 D707 D706
S(f) S(g) S(h) S(i)
D727 ISS254 D726 ISS254 D710 ISS254 D751 SEL2413E OPERATE
R732 220 R754 10K R750 47K
R726 1K R727 1K R728 1K M0 M1 M2
R729 47K R731 47K R730 47K
S719 RESET
※ VOLTAGE: STOP MODE.
TIMER/OPERATION SWITCH P.C.B

ON SCREEN DISPLAY (OSD)



※VOLTAGE : STOP MODE.

ON SCREEN DISPLAY P.C.B

Y (LUMINANZ)

IC201-4 PLAY 64μs/660mVp-p	IC201-19 PLAY 64μs/1.7Vp-p
IC201-5 PLAY 64μs/700mVp-p	IC201-20 REC 64μs/2.3Vp-p
IC201-7 PLAY 64μs/1.2Vp-p	IC201-20 PLAY 64μs/2.4Vp-p
IC201-9 PLAY 64μs/450mVp-p	IC201-22 PEC 64μs/520mVp-p
IC201-10 REC/PLAY 64μs/5.2Vp-p	IC201-22 PLAY 64μs/750mVp-p
IC201-12 REC 64μs/690mVp-p	IC201-24 REC 64μs/70mVp-p
IC201-13 PLAY 64μs/720mVp-p	IC201-24 PLAY 64μs/180mVp-p
IC201-14 PLAY 64μs/360mVp-p	IC201-26 REC 64μs/620mVp-p
IC201-17 REC 64μs/120mVp-p	IC201-26 PLAY 64μs/850mVp-p
IC201-17 PLAY 64μs/390mVp-p	IC201-28 REC 64μs/660mVp-p
IC201-18 REC/PLAY 64μs/210mVp-p	IC202-4 PLAY 64μs/2.9Vp-p
IC201-19 REC 64μs/1.3Vp-p	IC202-6 PLAY 64μs/680mVp-p

PG203 (12/16): GND, GND, TRICK PLAY, PB FM(C), CHROMA25Hz, C. SYNC, 5V, REC, 12V → To ON SCREEN DISPLAY PG3504

PG202: HEAD SW, 4.43MHz, VIDEO, CURRENT UP, SP, VIDEO, W. MUTE, PICTURE CONT, EDIT, PLAY, TRANSIENT, GND, SEARCH → To ON SCREEN DISPLAY PG3503

PG201: GND, PB FM(C), PB FM(Y), PB5V, REC12V, REC FM, REC-C, GND, CURRENT UP, CHROMA25Hz, —, SYNC → To PRE AMP PG002

PG204: GND, 5V, CHROMA25Hz, TRANSIENT, SP → To PREAMP PG003

13 LP, 1 SEARCH, 2 CHROMA25Hz, 3 4.43MHz, 4 PB FM(C), 5 VIDEO, 6 PB5V, 7 REC-C, 8 5V, 9 GND, 10 C. SYNC, 11 PB-C, 12 12V → To CHROMA 1, 13

Q206 2SA933S · QR205 DTC124ES · QR206 DTC124ES · QR201 DTC124ES · Q208 2SC1740S · Q209 2SC1740S · Q201 2SC1740S · QR207 DTC144ES · QR210 DTC144ES · Q205 2SA933S · QR202 DTC124ES · QR204 DTC124ES · QR203 DTC124ES · Q207 2SC1740S · Q202 2SA933S

D208 1SS254 · D209 1SS254 · D212 1SS254 · D301 1SS254 · D207 1SS254 · D210 1SS254 · D211 1SS254 · D203 1SS254 · D204 1SS254 · D202 1SS254 · D203 1SS254 · D201 1SS254

IC201 HT4907P · IC202 MSM6965P · IC203 NJM2228D

CP201 L.P.F / LC DELAY · CP205 · CP202 3.5MHz L.P.F · CP204 L.P.F

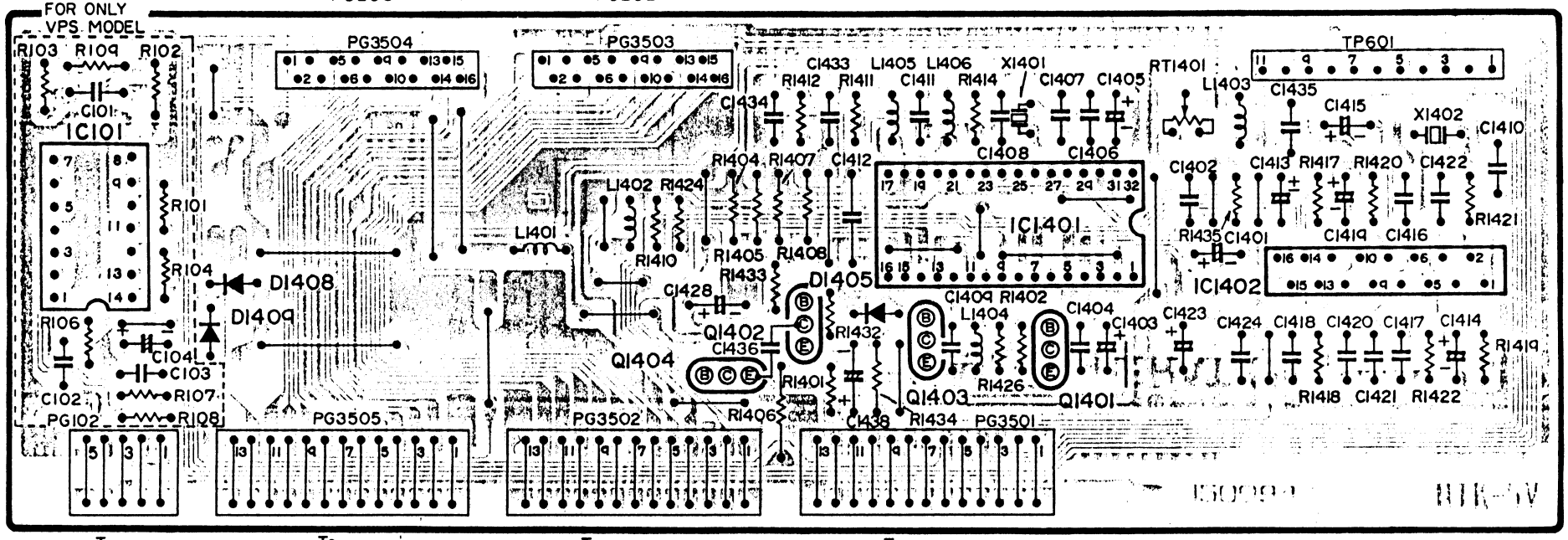
CLAMP · CCD 452 BIT COUNT · CLOCK GEN · PICTURE CONT · DETAIL ENHANCE · ENPHASIS · NOISE LIMIT · Y/C MIX · REC NOISE LIMIT · MAIN ENPH. · FM MOD · 6dB AMP · PB NOISE LIMIT · DOC · LIMIT · FM DEMOD · 3MHz L.P.F · AGC · AGC DET · DE ENPH. · SYNC SEPA · CORRELATIVE N.C · LIMIT · DETAIL ENPH · REC-Y · 1H DELAY LINE LEVEL

TP201 · TP202 · TP203 · TP204 · TP205

S1 · S2 · S3 · S4 · S5 · S6 · S8

* ONE VOLTAGE: PB OR REC MODE,
TWO VOLTAGES: PB AND (REC) MODE.

Y / CHROMA (Y SECTION) P. C. B



ON SCREEN DISPLAY P.C.B

IC101

—	7	8	6.0
—		9	0.2
—	5		4.8
0		11	0.2
4.8	3		4.8
4.8		13	3.9
0	1	14	5.2

※ VOLTAGE: STOP MODE.

IC1401

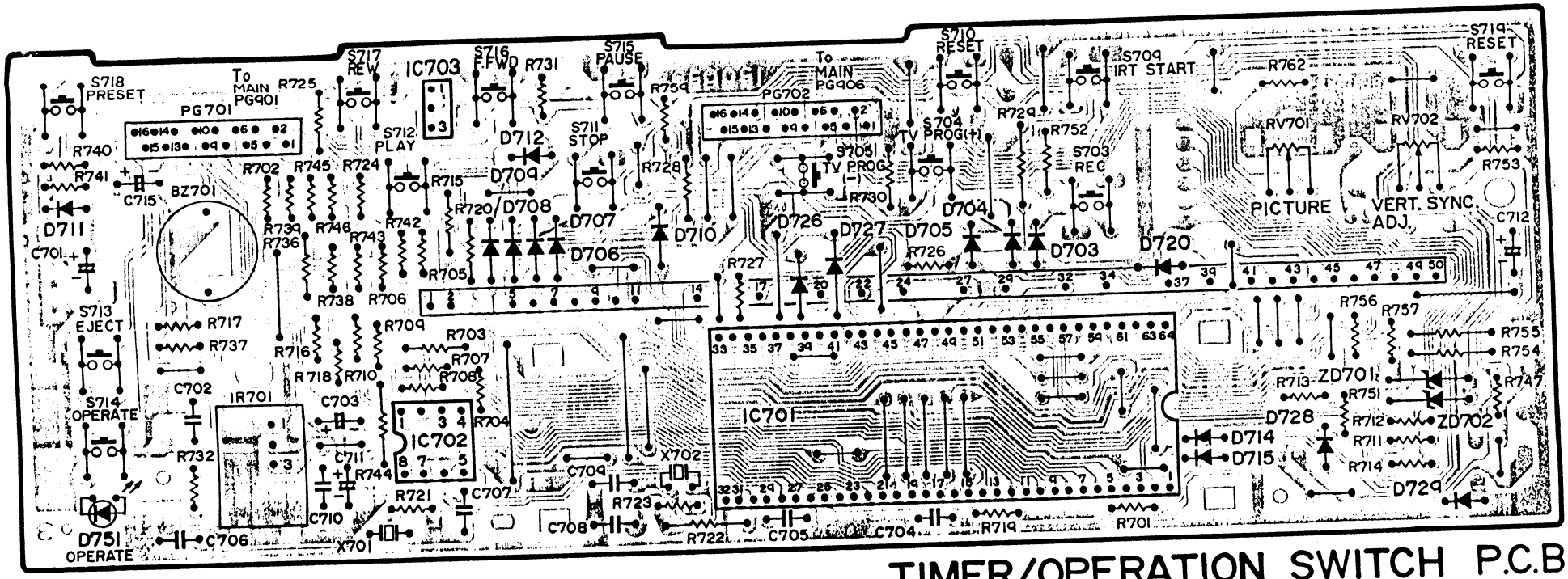
	5.2	2.0	4.5	0	0			2.2	0.4	4.8						
0.7	0.7	0	0	0			4.3	2.1	1.9							
17	19	21	23	25	27	29	31	32								
16	15	13	11	9	7	5	3	1								
0.7	1.0	0	0	0			2.4	4.7	0							
0.5	1.8	0.6	0	0.1	0		2.4	4.8								

IC1402

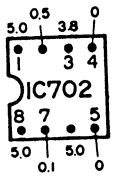
0.4	4.3	3.1	1.9	0	2.8	0.7	2.1	
16	14		10		6		2	
15	13		9		5		1	
5.0	0	0.6	2.1	2.1	2.1	2.4	2.7	

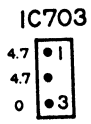
SCHEMATIC DIAGRAM

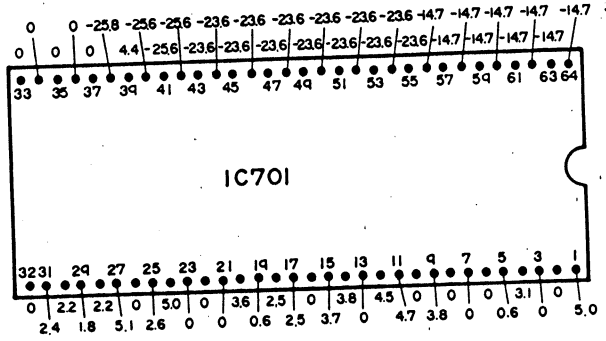
INTERNAL WIRING DIAGRAM 5-2
TUNER UNIT 5-4
IF UNIT 5-5
REGULATOR 5-6
F.S.TUNING 5-7
TIMER/OPERATION SWITCH 5-8
ON SCREEN DISPLAY 5-12
Y 5-14
PREAMP 5-16
CHROMA 5-17
SERVO 5-20
MOTOR DRIVE 5-22
SYSTEM CONTROL 5-24
SENSOR 5-25
JACK 5-26
AUDIO 5-28
RF CONVERTER 5-32
REMOTE CONTROL 5-33



TIMER/OPERATION SWITCH P.C.B





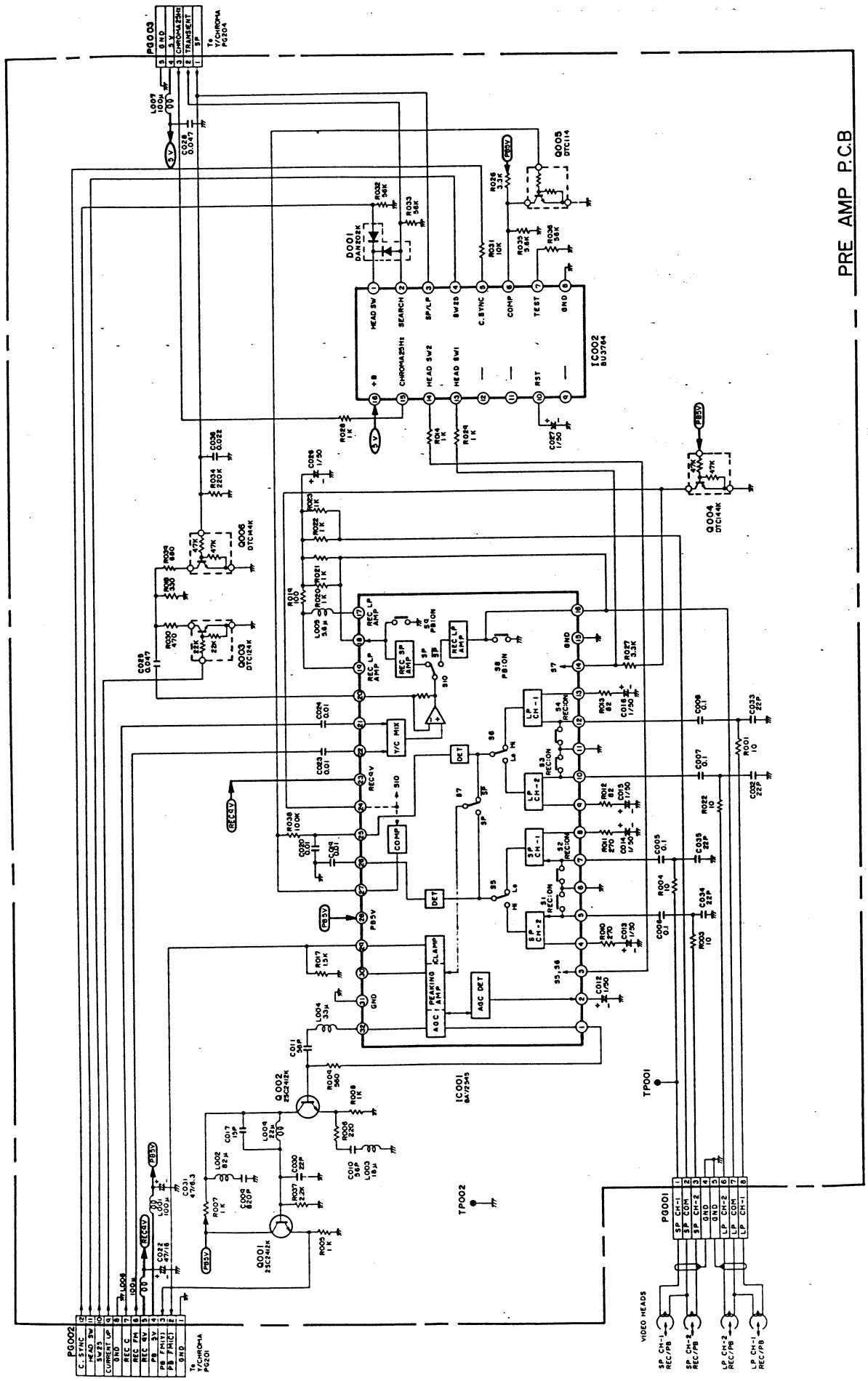


※ VOLTAGE : STOP MODE.

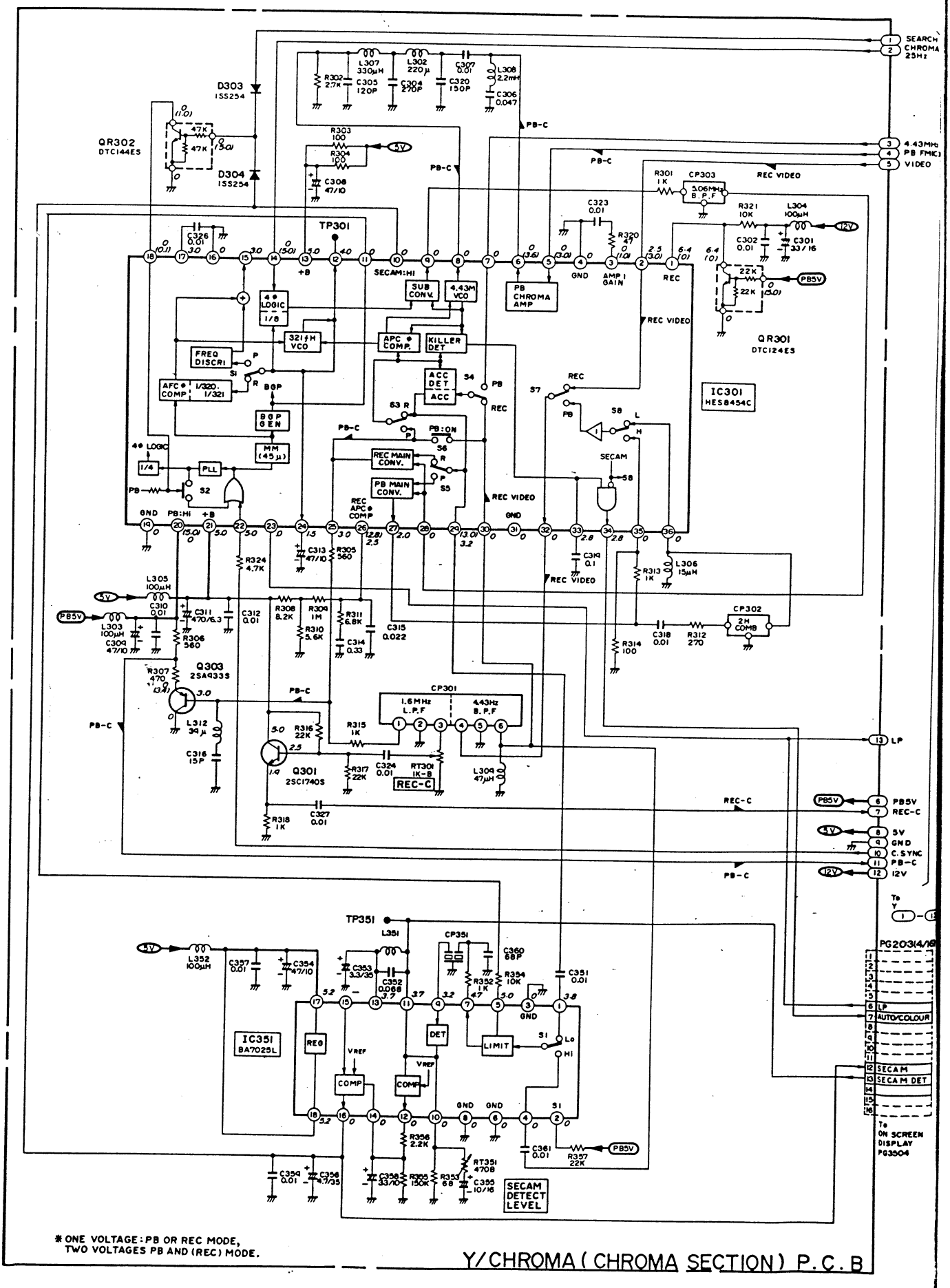
SCHEMATIC DIAGRAM

INTERNAL WIRING DIAGRAM	2
TUNER UNIT	4
IF UNIT	5
REGULATOR	6
F.S TUNING	7
TIMER/OPERATION SWITCH	8
ON SCREEN DISPLAY	12
Y	14
PREAMP	16
CHROMA	17
SERVO	20
MOTOR DRIVE	22
SYSTEM CONTROL	24
SENSOR	25
JACK	26
AUDIO	28
RF CONVERTER	32
REMOTE CONTROL	33

PREAMP (VORVERSTÄRKER)



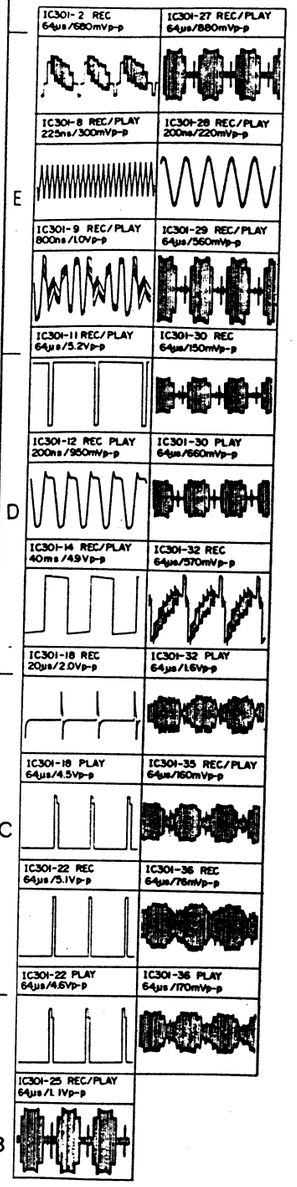
CHROMA (CHROMINANZ)

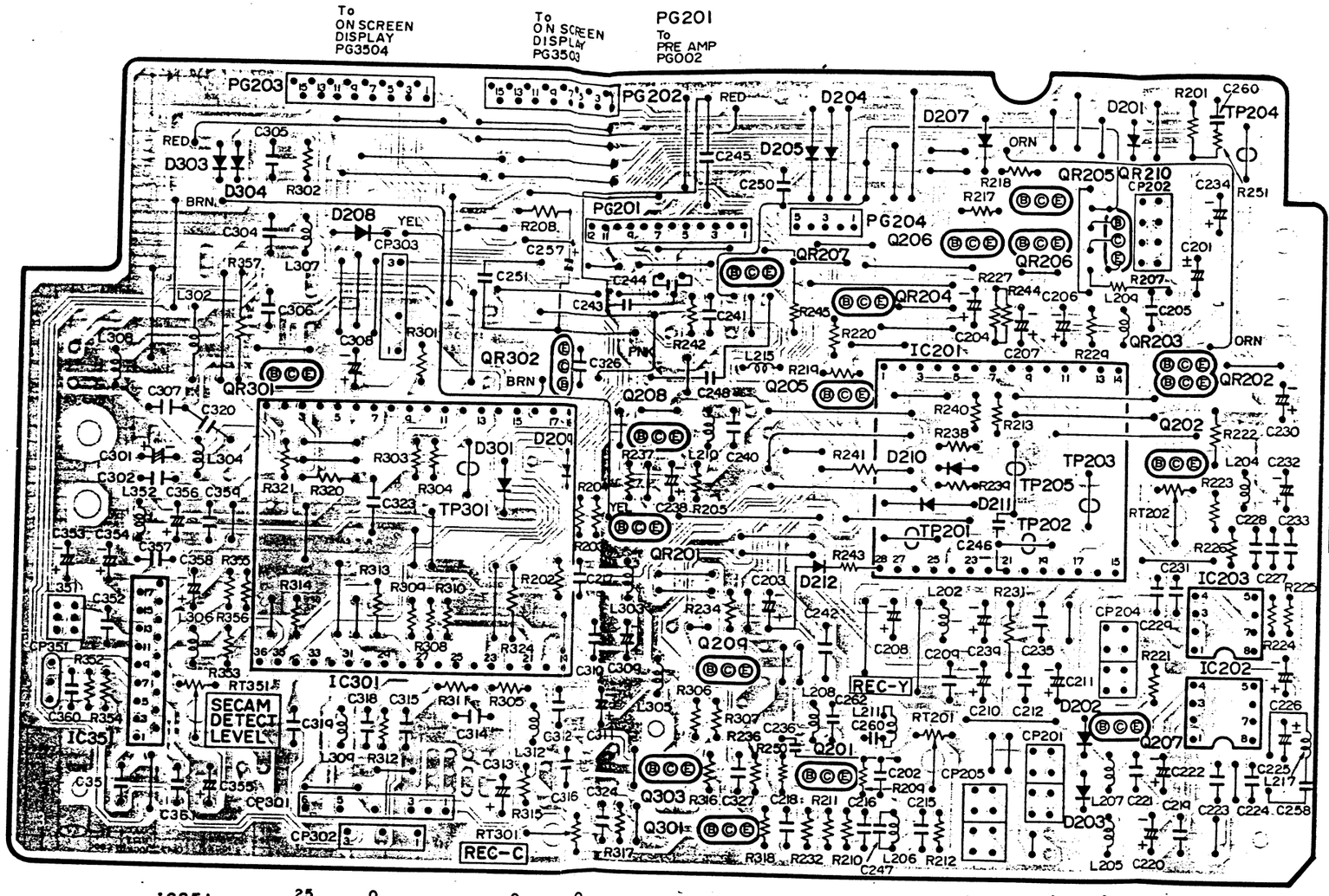


* ONE VOLTAGE : PB OR REC MODE,
TWO VOLTAGES PB AND (REC) MODE.

Y/CHROMA (CHROMA SECTION) P.C.B

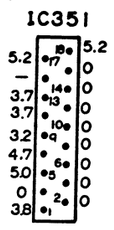
Y/CHROMA (LUMINANZ/CHROMINANZ)

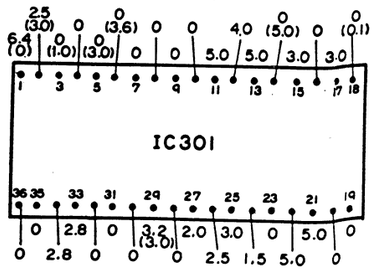


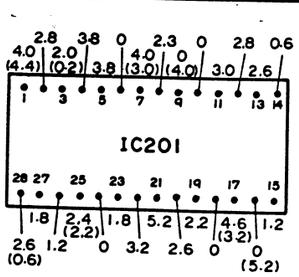


SCHEMATIC DIAGRAM

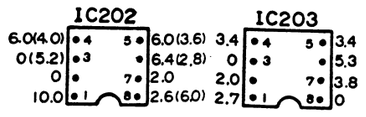
INTERNAL WIRING DIAGRAM	5- 2
TUNER UNIT	5- 4
IF UNIT	5- 5
REGULATOR	5- 6
F.S TUNING	5- 7
TIMER/OPERATION SWITCH	5- 8
ON SCREEN DISPLAY	5-12
Y	5-14
PREAMP	5-16
CHROMA	5-17
SERVO	5-20
MOTOR DRIVE	5-22
SYSTEM CONTROL	5-24
SENSOR	5-25
JACK	5-26
AUDIO	5-28
RF CONVERTER	5-32
REMOTE CONTROL	5-33







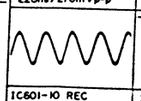
Y/CHROMA P.C.B



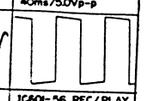
※ ONE VOLTAGE: PB OR REC MODE,
TWO VOLTAGES: PB AND(REC) MODE.

SERVO (SERVO)

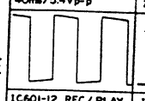
IC601-8 REC/PLAY 220ns/270mVp-p



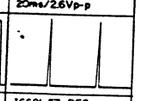
IC601-48 REC/PLAY 40ms/5.0Vp-p



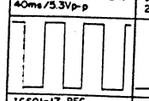
IC601-10 REC 40ms/5.4Vp-p



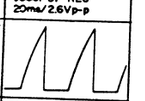
IC601-56 REC/PLAY 20ms/2.6Vp-p



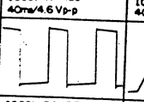
IC601-12 REC/PLAY 40ms/5.3Vp-p



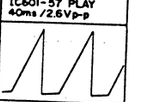
IC601-57 REC 20ms/2.6Vp-p



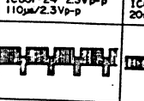
IC601-17 REC 40ms/4.6Vp-p



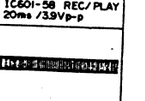
IC601-57 PLAY 40ms/2.6Vp-p



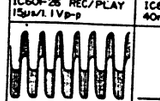
IC601-24 2.3Vp-p 110μs/2.3Vp-p



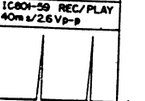
IC601-58 REC/PLAY 20ms/3.9Vp-p



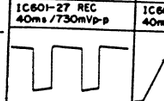
IC601-26 REC/PLAY 15μs/1.1Vp-p



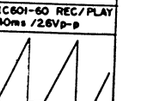
IC601-59 REC/PLAY 40ms/2.6Vp-p



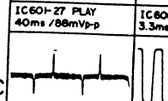
IC601-27 REC 40ms/730mVp-p



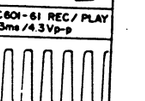
IC601-60 REC/PLAY 40ms/2.6Vp-p



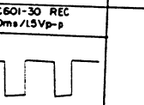
IC601-27 PLAY 40ms/88mVp-p



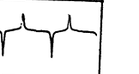
IC601-61 REC/PLAY 3.3ms/4.3Vp-p



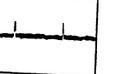
IC601-30 REC 40ms/1.5Vp-p



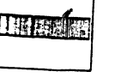
IC601-30 PLAY 40ms/1.8Vp-p

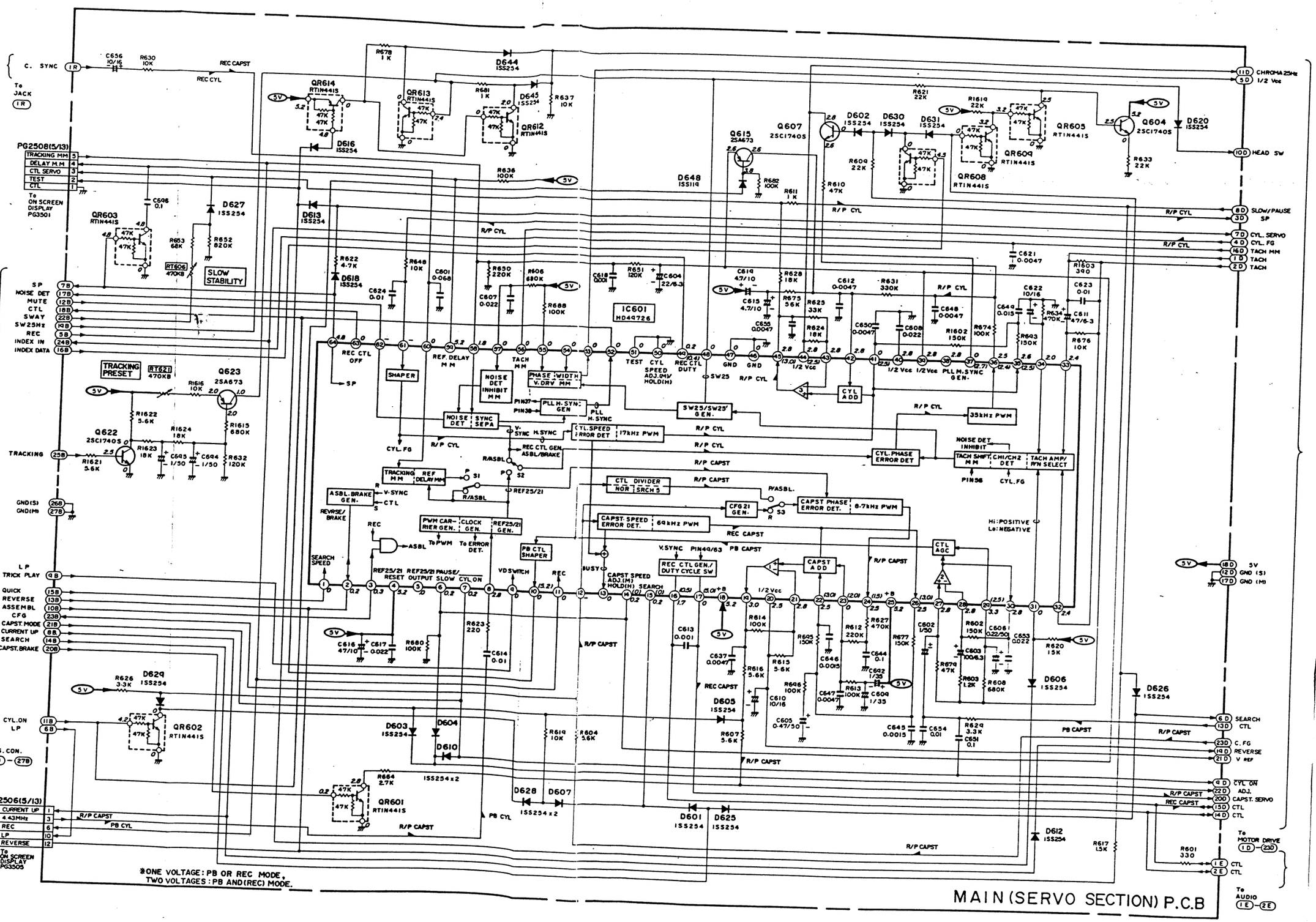


IC601-33 REC/PLAY 40ms/25mVp-p

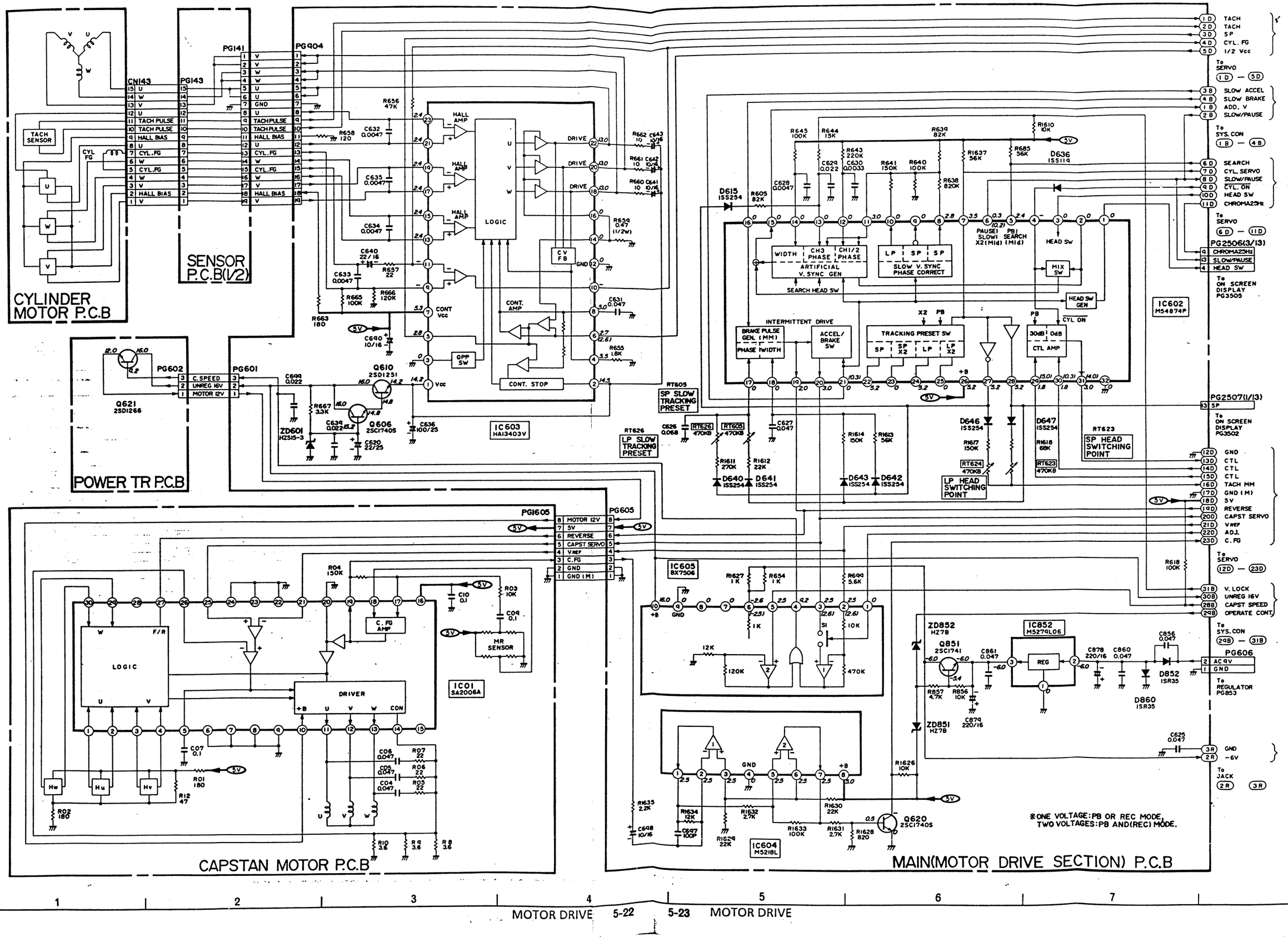


IC601-35 REC/PLAY 57μs/1.5Vp-p

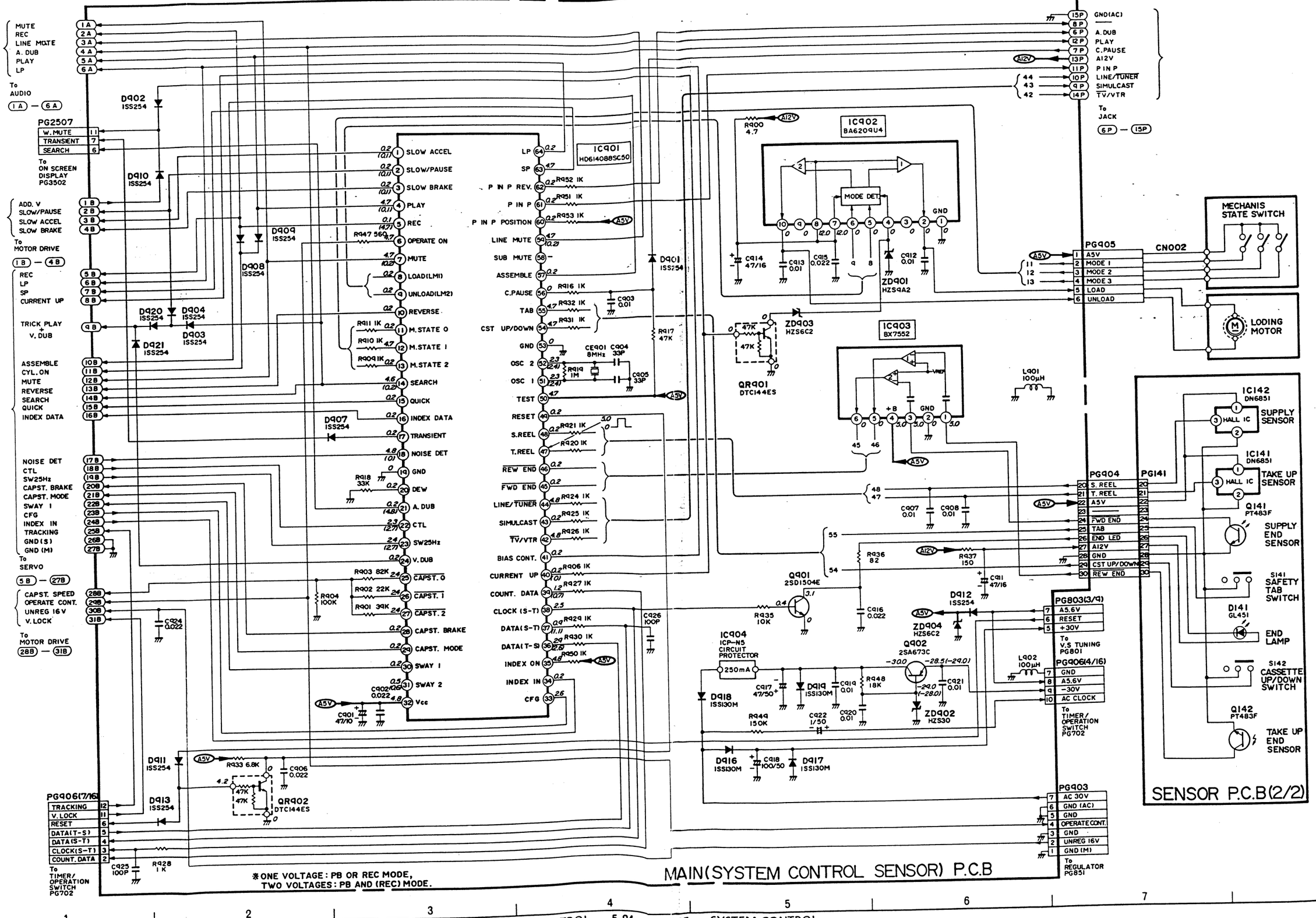




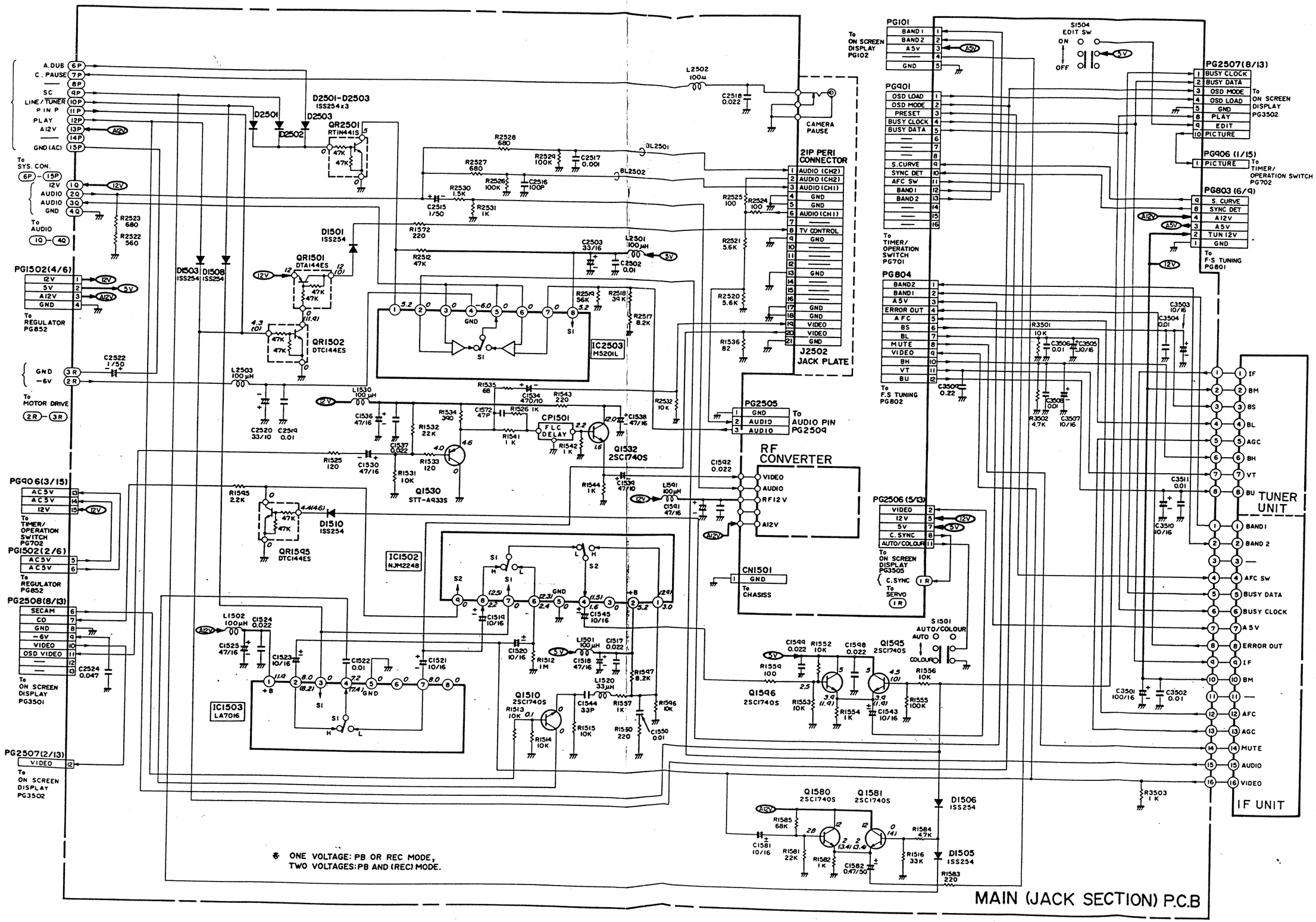
MOTOR DRIVE (MOTORTREIBER)



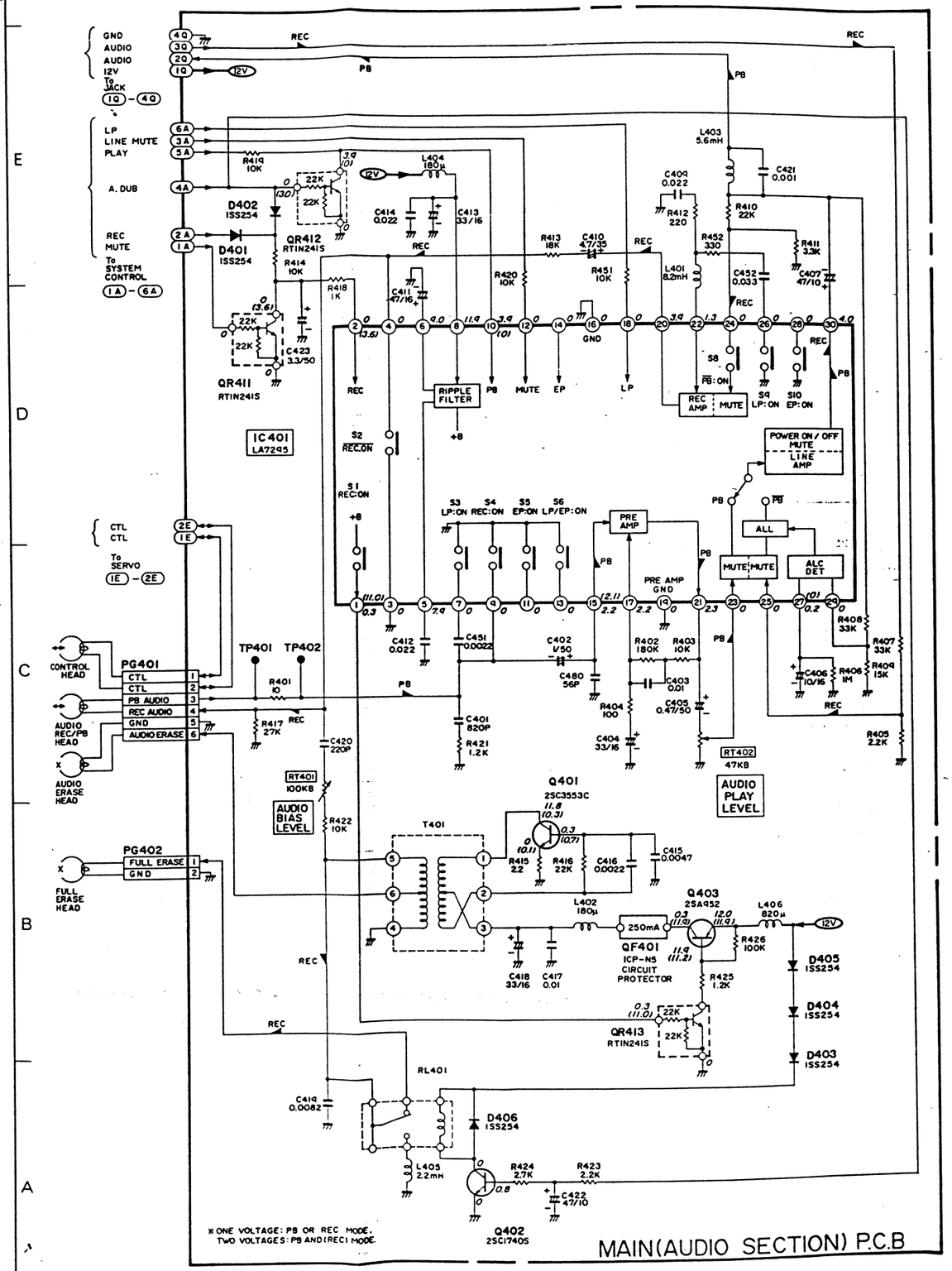
SYSTEM CONTROL (SYSTEMREGELUNG)



JACK (BUCHSE)

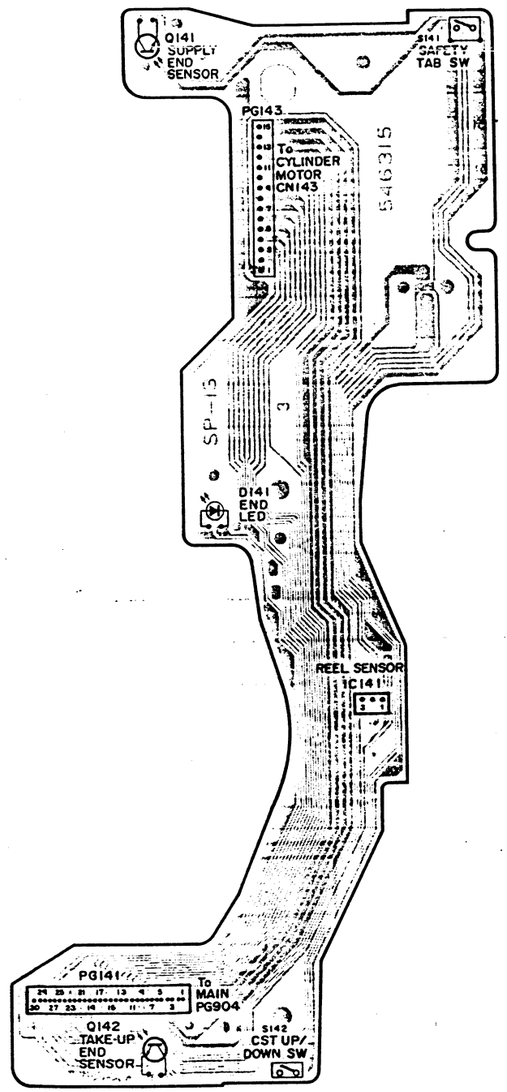

A.DUB 6P
C. PAUSE 7P
SC 9P
LINE/TUNER 10P
PIN P 11P
PLAY 12P
A12V 13P
GND(AC) 15P
To SYS. CON. 6P-15P
12V 1Q
AUDIO 2Q
AUDIO 3Q
GND 4Q
To AUDIO 1Q-4Q
PG1502(4/6)
12V 1
5V 2
A12V 3
GND 4
To REGULATOR PG852
GND 3R
-6V 2R
To MOTOR DRIVE 2R-3R
D2501-D2503 1SS254x3
D2501
D2502
D2503
QR2501 RTIN441S
D1501 1SS254
D1503 1SS254
D1508 1SS254
QR1501 DTA144ES
QR1502 DTC144ES
C2522 1/50
L2503 100µH
C2520 33/10
C2519 0.01
L1530 100µH
C1536 47/16
C1537 0.022
C1530 47/16
R1525 120
R1532 22K
R1533 120
R1531 10K
Q1530 STT-A933S
R1545 2.2K
D1510 1SS254
QR1505 DTC144ES
PG1406(3/15)
AC5V 13
AC5V 14
12V 15
To TIMER/OPERATION SWITCH PG702
PG1502(2/6)
AC5V 5
AC5V 6
To REGULATOR PG852
PG2508(8/13)
SECAM 6
CO 7
GND 8
-6V 9
VIDEO 10
OSD VIDEO 11
12 13
To ON SCREEN DISPLAY PG3501
C2524 0.047
PG2507(2/13)
VIDEO 12
To ON SCREEN DISPLAY PG3502
L2502 100µ
C2518 0.022
CAMERA PAUSE
R2528 680
R2529 100K
C2517 0.001
R2527 680
R2526 100K
C2516 100P
R2530 1.5K
C2515 1/50
R2531 1K
BL2501
BL2502
R1572 220
R2512 47K
C2503 33/16
L2501 100µH
C2502 0.01
R2525 100
R2524 100
R2521 5.6K
R2520 5.6K
R1536 82
21P PERI CONNECTOR
1 AUDIO (CH2)
2 AUDIO (CH2)
3 AUDIO (CH1)
4 GND
5 GND
6 AUDIO (CH1)
7 —
8 TV CONTROL
9 GND
10 —
11 —
12 —
13 GND
14 —
15 —
16 —
17 GND
18 GND
19 VIDEO
20 VIDEO
21 GND
J2502 JACK PLATE
R2519 56K
R2518 39K
R2517 8.2K
IC2503 M5201L
S1
R1535 68
C1534 470/10
R1543 220
R1526 1K
C1572 47P
CP1501 FLC DELAY
R1534 390
R1541 1K
R1542 1K
Q1532 2SC1740S
R1544 1K
C1538 47/16
L1591 100µH
C1591 47/16
R2532 10K
PG2505
GND 1
AUDIO 2
AUDIO 3
To AUDIO PIN PG2509
RF CONVERTER
VIDEO
AUDIO
RF12V
A12V
C1592 0.022
CN1501
GND
To CHASSIS
PG2506(5/13)
VIDEO 2
12V 5
5V 7
C.SYNC 8
AUTO/COLOUR 11
To ON SCREEN DISPLAY PG3505
C.SYNC
SERVO
IC1502 NJM2248
IC1503 LA7016
L1502 100µH
C1524 0.022
C1525 47/16
C1523 10/16
C1522 0.01
C1521 10/16
C1519 10/16
C1520 10/16
R1512 1M
L1501 100µH
C1517 0.022
C1518 47/16
L1520 33µH
R1547 8.2K
C1544 33P
R1557 1K
R1550 220
C1550 0.01
R1596 10K
R1513 10K
R1514 10K
R1515 10K
Q1510 2SC1740S
Q1596 2SC1740S
C1599 0.022
R1552 10K
C1598 0.022
Q1595 2SC1740S
R1559 100
R1553 10K
R1554 1K
C1543 10/16
R1555 100K
R1556 10K
S1501 AUTO/COLOUR
Q1580 2SC1740S
Q1581 2SC1740S
R1585 68K
C1581 10/16
R1581 22K
R1582 1K
C1582 0.47/50
R1583 220
R1584 4.7K
R1516 33K
D1506 1SS254
D1505 1SS254
PG101
BAND1 1
BAND2 2
A5V 3
GND 5
To ON SCREEN DISPLAY PG102
PG901
OSD LOAD 1
OSD MODE 2
PRESET 3
BUSY CLOCK 4
BUSY DATA 5
S.CURVE 9
SYNC DET 10
AFC SW 11
BAND1 12
BAND2 13
To TIMER/OPERATION SWITCH PG701
PG804
BAND2 1
BAND1 2
A5V 3
ERROR OUT 4
AFC 5
BS 6
BL 7
MUTE 8
VIDEO 9
BH 10
VT 11
BU 12
To F.S TUNING PG802
S1504 EDIT SW
ON
OFF
PG2507(8/13)
BUSY CLOCK 1
BUSY DATA 2
OSD MODE 3
OSD LOAD 4
GND 5
PLAY 8
EDIT 9
PICTURE 10
To ON SCREEN DISPLAY PG3502
PG906(1/15)
PICTURE 1
To TIMER/OPERATION SWITCH PG702
PG803(6/9)
S.CURVE 9
SYNC DET 8
A12V 4
A5V 3
TUN12V 2
GND 1
To F.S TUNING PG801
R3501 10K
C3503 10/16
C3504 0.01
C3506 0.01
C3505 10/16
C3509 0.22
R3502 4.7K
C3508
C3507 10/16
C3511 0.01
C3510 10/16
C3501 100/16
C3502 0.01
R3503 1K
TUNER UNIT
IF
BM
BS
BL
AGC
BH
VT
BU
BAND1
BAND 2
—
AFC SW
BUSY DATA
BUSY CLOCK
A5V
ERROR OUT
IF
BM
—
AFC
AGC
MUTE
AUDIO
VIDEO
IF UNIT
* ONE VOLTAGE: PB OR REC MODE,
TWO VOLTAGES: PB AND (REC) MODE.
MAIN (JACK SECTION) P.C.B

AUDIO (AUDIO)

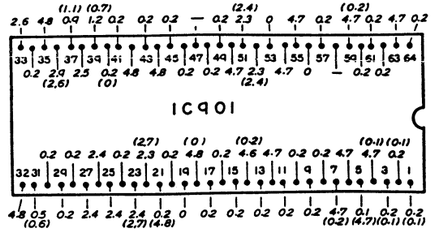


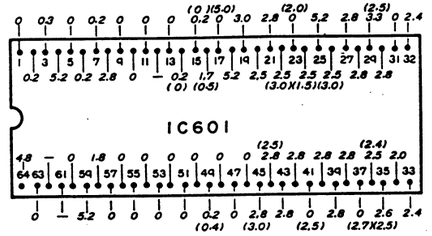
MAIN (AUDIO SECTION) P.C.B

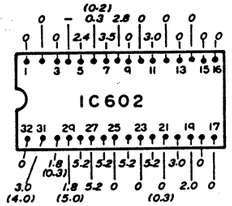
SENSOR (SENSOR)

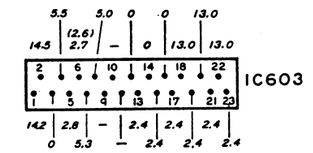


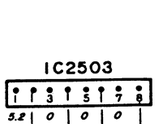
SENSOR P.C.B

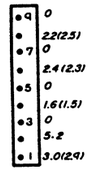


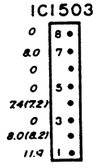


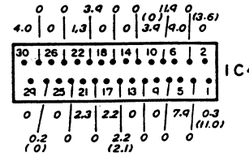


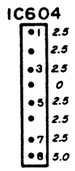


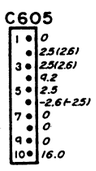


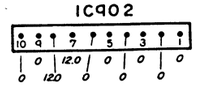


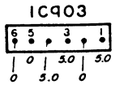










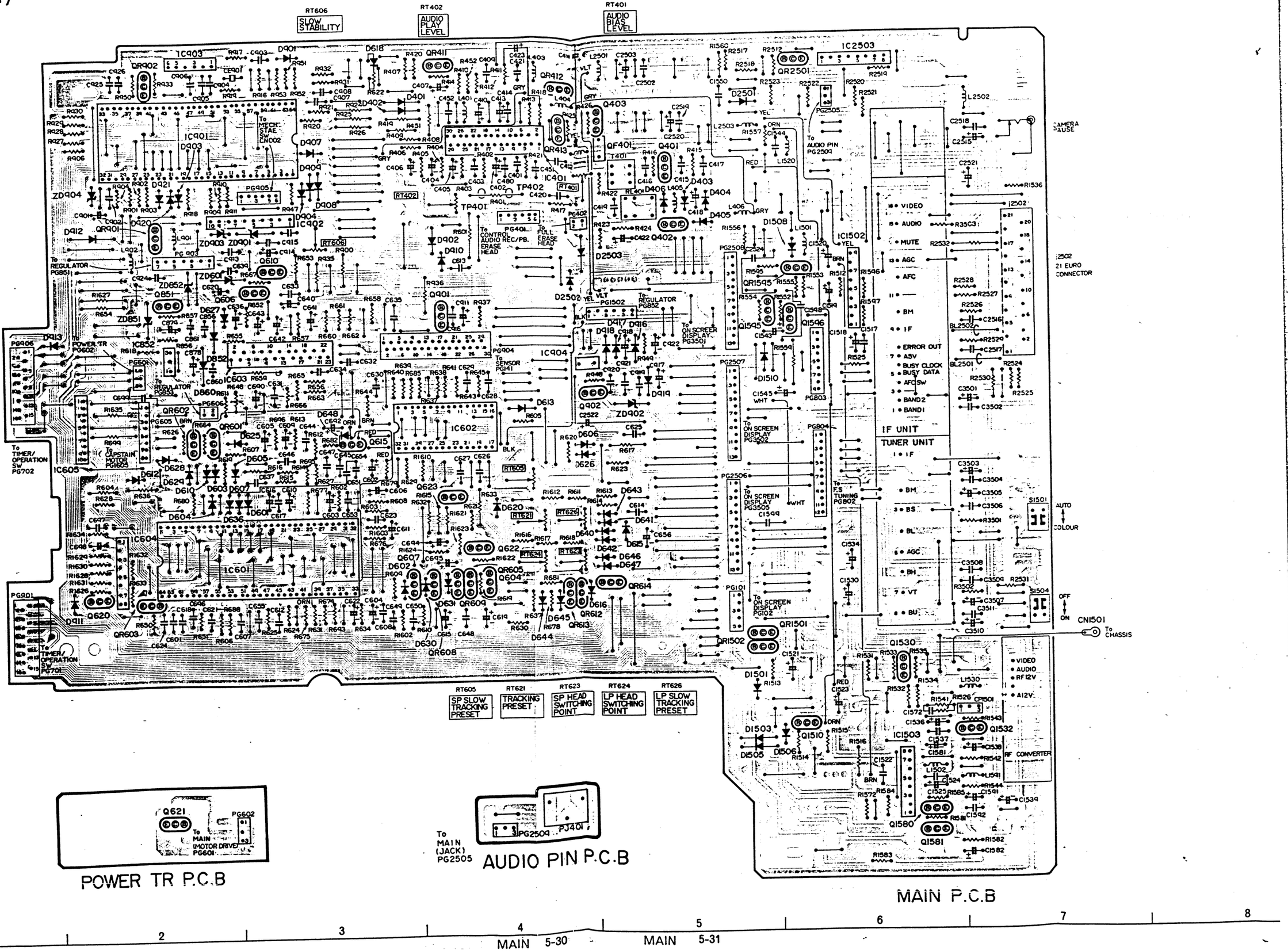


※ ONE VOLTAGE: PB OR REC MODE.
TWO VOLTAGES: PB AND (REC) MODE.

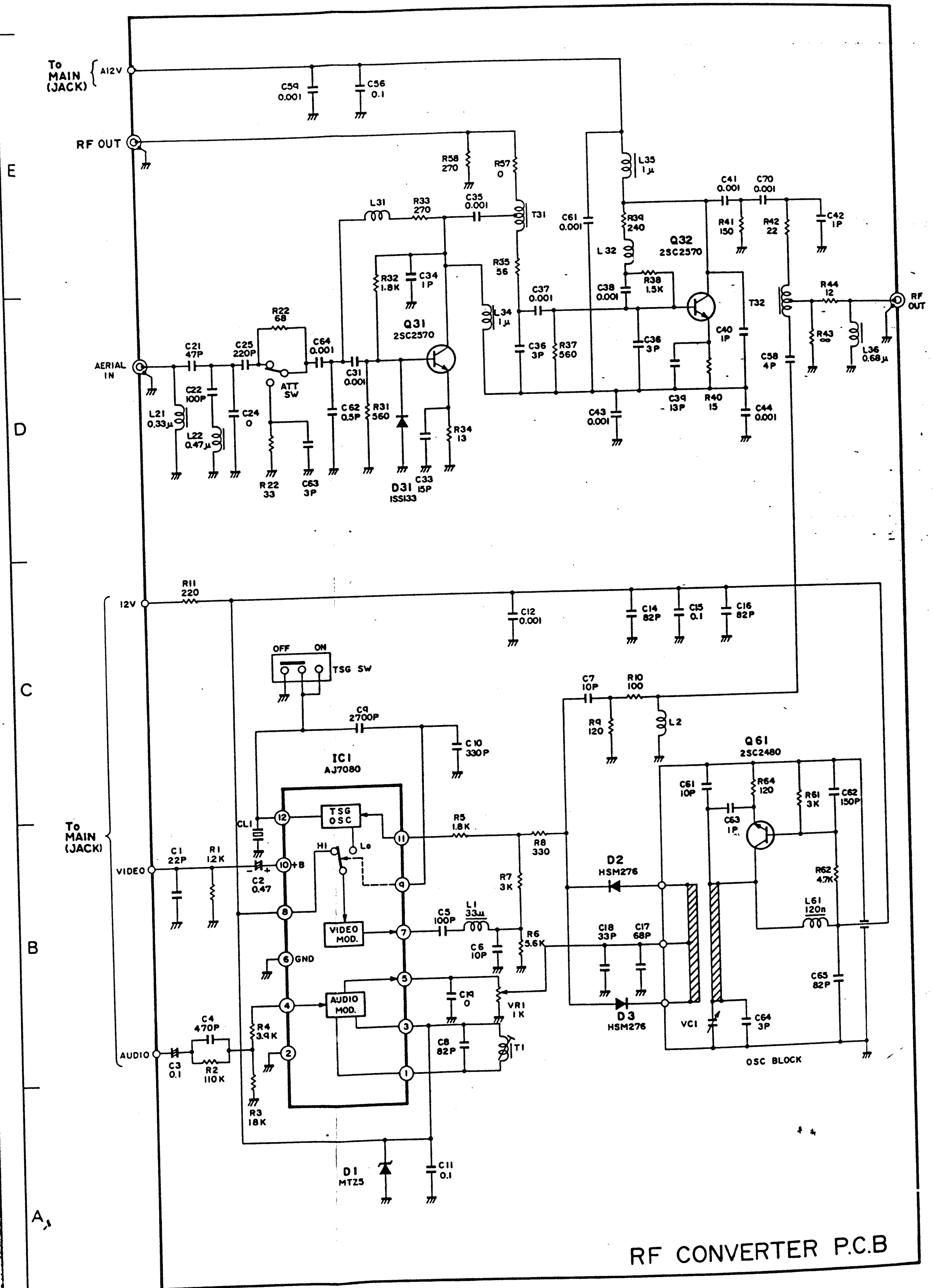
SCHEMATIC DIAGRAM

INTERNAL WIRING DIAGRAM	5- 2
TUNER UNIT	5- 4
IF UNIT	5- 5
REGULATOR	5- 6
F.S TUNING	5- 7
TIMER/OPERATION SWITCH	5- 8
ON SCREEN DISPLAY	5-12
Y	5-14
PREAMP	5-16
CHROMA	5-17
SERVO	5-20
MOTOR DRIVE	5-22
SYSTEM CONTROL	5-24
SENSOR	5-25
JACK	5-26
AUDIO	5-28
RF CONVERTER	5-32
REMOTE CONTROL	5-33

MAIN (HAUPT)

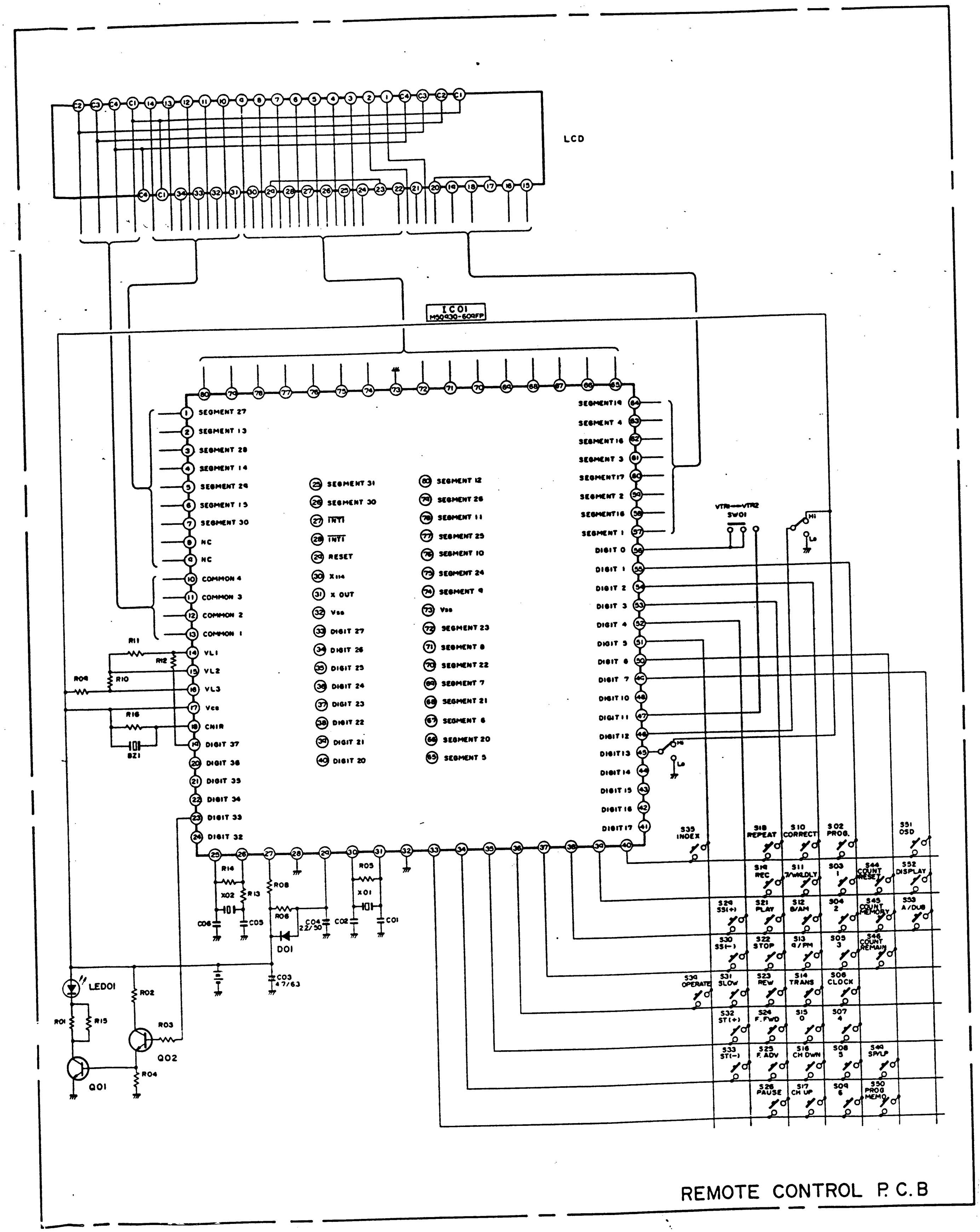

RT606
SLOW STABILITY
RT402
AUDIO PLAY LEVEL
RT401
AUDIO BIAS LEVEL
IC2503
IC1502
IC1503
IC1504
IC1601
IC1602
IC1603
IC1604
IC1605
IC1901
IC1902
IC401
IC602
IC852
IF UNIT
TUNER UNIT
VIDEO
AUDIO
MUTE
AGC
AFC
BM
IF
ERROR OUT
A5V
BUSY CLOCK
BUSY DATA
AFC SW
BAND2
BAND1
BS
BL
VT
BU
CAMERA PAUSE
J502
21 EURO CONNECTOR
AUTO COLOUR
OFF ON
CN1501
To CHASSIS
RF CONVERTER
To REGULATOR PG851
To POWER TR PG602
To REGULATOR PG852
To TIMER/ OPERATION SW PG702
To UPSTAIR MOTOR PG603
To MECH. STAE SW ZN002
To CONTROL AUDIO REC/PB. ERASE HEAD
To FULL ERASE HEAD
To SENSOR PG141
To ON SCREEN DISPLAY PG350J
To ON SCREEN DISPLAY PG350Z
To ON SCREEN DISPLAY PG350S
To ON SCREEN DISPLAY PG3502
To ON SCREEN DISPLAY PG3505
To ON SCREEN DISPLAY PG3102
To AUDIO PIN PG2504
To F.S TUNING PG802
To TIMER/ OPERATION SW PG701
RT605 SP SLOW TRACKING PRESET
RT621 TRACKING PRESET
RT623 SP HEAD SWITCHING POINT
RT624 LP HEAD SWITCHING POINT
RT626 LP SLOW TRACKING PRESET
Q621
PG602
To MAIN (MOTOR DRIVE) PG601
POWER TR P.C.B
To MAIN (JACK) PG2505
PG2504
PJ401
AUDIO PIN P.C.B
MAIN P.C.B
MAIN 5-30
MAIN 5-31

RF CONVERTER (HF-KONVERTER)



To MAIN (JACK) A12V
C59 0.001
C56 0.1
RF OUT
R58 270
R57 0
L35 1μ
L31
R33 270
C35 0.001
T31
C61 0.001
R39 240
L32
Q32 2SC2570
C41 0.001
C70 0.001
R41 150
R42 22
C42 1P
R32 1.8K
C34 1P
R35 56
C37 0.001
C38 0.001
R38 1.5K
T32
R44 12
RF OUT
R22 68
Q31 2SC2570
L34 1μ
C36 3P
R37 560
C40 1P
R43 ∞
L36 0.68μ
C58 4P
AERIAL IN
C21 47P
C25 220P
C64 0.001
ATT SW
C31 0.001
C22 100P
C24 0
C62 0.5P
R31 560
R34 13
C43 0.001
C39 13P
R40 15
C44 0.001
L21 0.33μ
L22 0.47μ
R22 33
C63 3P
D31 1SS133
C33 15P
12V
R11 220
C12 0.001
C14 82P
C15 0.1
C16 82P
OFF ON
TSG SW
C9 2700P
C10 330P
C7 10P
R10 100
R9 120
L2
IC1 AJ7080
Q61 2SC2480
TSG OSC
CL1
To MAIN (JACK)
VIDEO
C1 22P
R1 1.2K
C2 0.47
Hi Lo
+B
R5 1.8K
R8 330
D2 HSM276
C61 10P
R64 120
R61 3K
C62 150P
C63 1P
R7 3K
VIDEO MOD.
C5 100P
L1 33μ
C6 10P
R6 5.6K
C18 33P
C17 68P
R62 4.7K
L61 120n
GND
AUDIO MOD.
C19 0
VR1 1K
C65 82P
AUDIO
C4 470P
R4 3.9K
C3 0.1
R2 110K
C8 82P
T1
D3 HSM276
VC1
C64 3P
OSC BLOCK
R3 18K
D1 MTZ5
C11 0.1
RF CONVERTER P.C.B

REMOTE CONTROL (FERNBEDIENUNG)



LCD
IC01 M50930-609FP
SEGMENT 27
SEGMENT 13
SEGMENT 28
SEGMENT 14
SEGMENT 29
SEGMENT 15
SEGMENT 30
NC
NC
COMMON 4
COMMON 3
COMMON 2
COMMON 1
VL1
VL2
VL3
Vcc
CNIR
DIGIT 37
DIGIT 36
DIGIT 35
DIGIT 34
DIGIT 33
DIGIT 32
25 SEGMENT 31
26 SEGMENT 30
27 INT1
28 INT1
29 RESET
30 XIN
31 X OUT
32 Vss
33 DIGIT 27
34 DIGIT 26
35 DIGIT 25
36 DIGIT 24
37 DIGIT 23
38 DIGIT 22
39 DIGIT 21
40 DIGIT 20
80 SEGMENT 12
79 SEGMENT 26
78 SEGMENT 11
77 SEGMENT 25
76 SEGMENT 10
75 SEGMENT 24
74 SEGMENT 9
73 Vss
72 SEGMENT 23
71 SEGMENT 8
70 SEGMENT 22
69 SEGMENT 7
68 SEGMENT 21
67 SEGMENT 6
66 SEGMENT 20
65 SEGMENT 5
SEGMENT19
SEGMENT 4
SEGMENT16
SEGMENT 3
SEGMENT17
SEGMENT 2
SEGMENT16
SEGMENT 1
DIGIT 0
DIGIT 1
DIGIT 2
DIGIT 3
DIGIT 4
DIGIT 5
DIGIT 6
DIGIT 7
DIGIT 10
DIGIT 11
DIGIT 12
DIGIT 13
DIGIT 14
DIGIT 15
DIGIT 16
DIGIT 17
VTR1—VTR2 SW01
Hi Lo
R11 R12 R09 R10 R16 BZ1
R14 X02 R13 R08 R06 R05 X01
C06 C05 C04 22/50 C02 C01
D01
C03 47/63
LED01
R02 R01 R15 R03 R04
Q01 Q02
S35 INDEX
S18 REPEAT
S10 CORRECT
S02 PROG.
S51 OSD
S19 REC
S11 7/WKLDLY
S03 1
S44 COUNT RESET
S52 DISPLAY
S29 SS(+)
S21 PLAY
S12 8/AM
S04 2
S45 COUNT MEMORY
S53 A/DUB
S30 SS(−)
S22 STOP
S13 9/PM
S05 3
S46 COUNT REMAIN
S34 OPERATE
S31 SLOW
S23 REW
S14 TRANS
S06 CLOCK
S32 ST(+)
S24 F.FWD
S15 0
S07 4
S33 ST(−)
S25 F.ADV
S16 CH DWN
S08 5
S49 SP/LP
S26 PAUSE
S17 CH UP
S09 6
S50 PROG MEMO
REMOTE CONTROL P.C.B

EPLACEMENT PARTS LIST (ERSATZTEILLISTE)
ECTRICAL PARTS LIST (ELECTRISCHE STÜCKLISTE)

MBOL-No	P-No	DESCRIPTION
		CAPACITORS
202	0208374	CERAMIC DISC 10000PF+-20% 16V
205	0890021	CERAMIC DISC 82PF+-5% 50V
209	0208375	CERAMIC DISC 22000PF+80-20% 25V
212	0208375	CERAMIC DISC 22000PF+80-20% 25V
215	0208352	CERAMIC DISC 22PF+-5% 50V
216	0208352	CERAMIC DISC 22PF+-5% 50V
217	0208375	CERAMIC DISC 22000PF+80-20% 25V
218	0208375	CERAMIC DISC 22000PF+80-20% 25V
219	0208374	CERAMIC DISC 10000PF+-20% 16V
221	0208374	CERAMIC DISC 10000PF+-20% 16V
223	0208374	CERAMIC DISC 10000PF+-20% 16V
224	0208374	CERAMIC DISC 10000PF+-20% 16V
227	0208374	CERAMIC DISC 10000PF+-20% 16V
228	0890011	CERAMIC DISC 15PF+-5% 50V
229	0208374	CERAMIC DISC 10000PF+-20% 16V
231	0208367	CERAMIC DISC 1000PF+-10% 50V
233	0208375	CERAMIC DISC 22000PF+80-20% 25V
235	0890031	CERAMIC DISC 470PF+-20% 16V
302	0208374	CERAMIC DISC 10000PF+-20% 16V
307	0208374	CERAMIC DISC 10000PF+-20% 16V
310	0208374	CERAMIC DISC 10000PF+-20% 16V
312	0208374	CERAMIC DISC 10000PF+-20% 16V
318	0208374	CERAMIC DISC 10000PF+-20% 16V
323	0208374	CERAMIC DISC 10000PF+-20% 16V
324	0208374	CERAMIC DISC 10000PF+-20% 16V
327	0208374	CERAMIC DISC 10000PF+-20% 16V
351	0208374	CERAMIC DISC 10000PF+-20% 16V
357	0208374	CERAMIC DISC 10000PF+-20% 16V
359	0208374	CERAMIC DISC 10000PF+-20% 16V
360	0208358	CERAMIC DISC 68PF+-5% 50V
361	0208374	CERAMIC DISC 10000PF+-20% 16V
412	0208375	CERAMIC DISC 22000PF+80-20% 25V
414	0208375	CERAMIC DISC 22000PF+80-20% 25V
417	0208374	CERAMIC DISC 10000PF+-20% 16V
420	0208362	CERAMIC DISC 220PF+-10% 50V
480	0208357	CERAMIC DISC 56PF+-5% 50V
608	0208375	CERAMIC DISC 22000PF+80-20% 25V
613	0208367	CERAMIC DISC 1000PF+-10% 50V
614	0208374	CERAMIC DISC 10000PF+-20% 16V
617	0208375	CERAMIC DISC 22000PF+80-20% 25V
618	0890035	CERAMIC DISC 1000PF+-10% 50V
623	0208374	CERAMIC DISC 10000PF+-20% 16V
624	0208374	CERAMIC DISC 10000PF+-20% 16V
632	0208371	CERAMIC DISC 4700PF+-20% 50V
633	0208371	CERAMIC DISC 4700PF+-20% 50V
634	0208371	CERAMIC DISC 4700PF+-20% 50V
635	0208371	CERAMIC DISC 4700PF+-20% 50V
639	0208375	CERAMIC DISC 22000PF+80-20% 25V
653	0890044	CERAMIC DISC 22000PF+80-20% 25V
697	0208360	CERAMIC DISC 100PF+-10% 50V
02	0208374	CERAMIC DISC 10000PF+-20% 16V
04	0208374	CERAMIC DISC 10000PF+-20% 16V
05	0208374	CERAMIC DISC 10000PF+-20% 16V
.0	0208374	CERAMIC DISC 10000PF+-20% 16V
08	0208374	CERAMIC DISC 10000PF+-20% 16V
809	0208374	CERAMIC DISC 10000PF+-20% 16V
10	0208374	CERAMIC DISC 10000PF+-20% 16V
.0	0208374	CERAMIC DISC 10000PF+-20% 16V
1	0208374	CERAMIC DISC 10000PF+-20% 16V
.2	0208360	CERAMIC DISC 100PF+-10% 50V
6	0256888	ELECTROLYTIC 4700UF 35V
30	0256881	ELECTROLYTIC 2200UF 16V
02	0208375	CERAMIC DISC 22000PF+80-20% 25V
C 903	0208374	CERAMIC DISC 10000PF+-20% 16V
904	0208354	CERAMIC DISC 33PF+-5% 50V
905	0208354	CERAMIC DISC 33PF+-5% 50V
906	0208375	CERAMIC DISC 22000PF+80-20% 25V
907	0208374	CERAMIC DISC 10000PF+-20% 16V
908	0208374	CERAMIC DISC 10000PF+-20% 16V
912	0208374	CERAMIC DISC 10000PF+-20% 16V
913	0208374	CERAMIC DISC 10000PF+-20% 16V
915	0208375	CERAMIC DISC 22000PF+80-20% 25V
916	0208375	CERAMIC DISC 22000PF+80-20% 25V
925	0208360	CERAMIC DISC 100PF+-10% 50V
926	0208360	CERAMIC DISC 100PF+-10% 50V
1404	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1406	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1409	0208354	CERAMIC DISC 33PF+-5% 50V

SYMBOL-No	P-No	DESCRIPTION
C1411	0208374	CERAMIC DISC 10000PF+-20% 16V
C1412	0208374	CERAMIC DISC 10000PF+-20% 16V
C1413	0256674	ELECTROLYTIC 4.7UF 35V
C1416	0208369	CERAMIC DISC 2200PF+-20% 16V
C1421	0208360	CERAMIC DISC 100PF+-10% 50V
C1422	0208366	CERAMIC DISC 820PF+-10% 50V
C1424	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1517	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1524	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1537	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1540	0208375	CERAMIC DISC 22000PF+80-20% 25V
C1544	0208354	CERAMIC DISC 33PF+-5% 50V
C1550	0208374	CERAMIC DISC 10000PF+-20% 16V
C1592	0208375	CERAMIC DISC 22000PF+80-20% 25V
C2502	0208374	CERAMIC DISC 10000PF+-20% 16V
C2509	0256836	ELECTROLYTIC 2.2UF 35V
C2516	0208360	CERAMIC DISC 100PF+-10% 50V
C2517	0208367	CERAMIC DISC 1000PF+-10% 50V
C2518	0208375	CERAMIC DISC 22000PF+80-20% 25V
C2519	0208374	CERAMIC DISC 10000PF+-20% 16V
C3502	0208374	CERAMIC DISC 10000PF+-20% 16V
C3504	0208374	CERAMIC DISC 10000PF+-20% 16V
C3506	0208374	CERAMIC DISC 10000PF+-20% 16V
C3508	0208374	CERAMIC DISC 10000PF+-20% 16V
C3511	0208374	CERAMIC DISC 10000PF+-20% 16V
		RESISTORS
R 659	0149705	METAL OXIDE 0.47OHM+-5% 1/2W
R 837	0170486	FUSE RESISTOR 22OHM+-5% 1/2W
R 900	0249683	POSISTOR 4.7OHM
RT 201	5030004	SEMI VARIABLE 1KOHM
RT 202	5030004	SEMI VARIABLE 1KOHM
RT 301	5030004	SEMI VARIABLE 1KOHM
RT 351	5030003	SEMI VARIABLE 470OHM
RT 401	5030011	SEMI VARIABLE 100KOHM
RT 402	5030009	SEMI VARIABLE 47KOHM
RT 605	5030013	SEMI VARIABLE 47OKOHM
RT 606	5030013	SEMI VARIABLE 47OKOHM
RT 621	5030013	SEMI VARIABLE 47OKOHM
RT 623	5030013	SEMI VARIABLE 47OKOHM
RT 624	5030013	SEMI VARIABLE 47OKOHM
RT 626	5030013	SEMI VARIABLE 47OKOHM
RT 801	5007461	RESISTOR SEMI VARIABLE 4.7K OHM
RT1401	5007458	RESISTOR SEMI VARIABLE 1K OHM
RV 701	5009204	VARIABLE RESISTOR 10KOHM
RV 702	5001673	VARIABLE RESISTOR 50KOHM
RL 401	5641571	RELAY
		SEMI-CONDUCTORS
D 141	5380933	LED GL-451
D 201	5339131	DIODE 1SS254
D 202	5339131	DIODE 1SS254
D 203	5339131	DIODE 1SS254
D 204	5339131	DIODE 1SS254
D 205	5339131	DIODE 1SS254
D 207	5339131	DIODE 1SS254
D 208	5339131	DIODE 1SS254
D 209	5339131	DIODE 1SS254
D 210	5339131	DIODE 1SS254
D 211	5339131	DIODE 1SS254
D 212	5332781	DIODE 1SS254
D 213	5332781	DIODE 1SS254
D 301	5339131	DIODE 1SS254
D 303	5339131	DIODE 1SS254
D 304	5339131	DIODE 1SS254
D 401	5339131	DIODE 1SS254
D 402	5339131	DIODE 1SS254
D 403	5339131	DIODE 1SS254
D 404	5339131	DIODE 1SS254
D 405	5339131	DIODE 1SS254
D 406	5339131	DIODE 1SS254
D 601	5339131	DIODE 1SS254
D 602	5339131	DIODE 1SS254
D 603	5339131	DIODE 1SS254
D 604	5339131	DIODE 1SS254
D 605	5339131	DIODE 1SS254
D 606	5339131	DIODE 1SS254
D 607	5339131	DIODE 1SS254

SYMBOL-No	P-No	DESCRIPTION
D 610	5339131	DIODE 1SS254
D 612	5339131	DIODE 1SS254
D 613	5339131	DIODE 1SS254
D 615	5339131	DIODE 1SS254
D 616	5339131	DIODE 1SS254
D 618	5339131	DIODE 1SS254
D 620	5339131	DIODE 1SS254
D 625	5339131	DIODE 1SS254
D 626	5339131	DIODE 1SS254
D 627	5339131	DIODE 1SS254
D 628	5339131	DIODE 1SS254
D 629	5339131	DIODE 1SS254
D 630	5339131	DIODE 1SS254
D 631	5339131	DIODE 1SS254
D 636	5339131	DIODE 1SS254
D 640	5339131	DIODE 1SS254
D 641	5339131	DIODE 1SS254
D 642	5339131	DIODE 1SS254
D 643	5339131	DIODE 1SS254
D 644	5339131	DIODE 1SS254
D 645	5339131	DIODE 1SS254
D 646	5339131	DIODE 1SS254
D 647	5339131	DIODE 1SS254
D 648	5332681	DIODE 1SS119
D 703	5339131	DIODE 1SS254
D 704	5339131	DIODE 1SS254
D 705	5339131	DIODE 1SS254
D 706	5339131	DIODE 1SS254
D 707	5339131	DIODE 1SS254
D 708	5339131	DIODE 1SS254
D 709	5339131	DIODE 1SS254
D 710	5339131	DIODE 1SS254
D 711	5339131	DIODE 1SS254
D 712	5339131	DIODE 1SS254
D 714	5339131	DIODE 1SS254
D 715	5339131	DIODE 1SS254
D 720	5339131	DIODE 1SS254
D 726	5339131	DIODE 1SS254
D 727	5339131	DIODE 1SS254
D 728	5339131	DIODE 1SS254
D 729	5339131	DIODE 1SS254
D 751	5381214	LED SEL2413E
D 801	5332541	DIODE ERA81-004-P
D 802	5339131	DIODE 1SS254
D 804	5339131	DIODE 1SS254
⚠D 851	5333351	DIODE D3SBA10
D 852	5339231	DIODE 1SR35-100A
D 854	5339131	DIODE 1SS254
D 855	5339131	DIODE 1SS254
⚠D 856	5339231	DIODE 1SR35-100A
⚠D 857	5339231	DIODE 1SR35-100A
⚠D 858	5339231	DIODE 1SR35-100A
⚠D 859	5339231	DIODE 1SR35-100A
D 860	5339231	DIODE 1SR35-100A
D 861	5339231	DIODE 1SR35-100A
D 862	5339231	DIODE 1SR35-100A
D 863	5339231	DIODE 1SR35-100A
D 864	5339231	DIODE 1SR35-100A
D 901	5339131	DIODE 1SS254
D 902	5339131	DIODE 1SS254
D 903	5339131	DIODE 1SS254
D 904	5339131	DIODE 1SS254
D 907	5339131	DIODE 1SS254
D 908	5339131	DIODE 1SS254
D 909	5339131	DIODE 1SS254
D 910	5339131	DIODE 1SS254
D 911	5339131	DIODE 1SS254
D 912	5339131	DIODE 1SS254
D 913	5339131	DIODE 1SS254
D 916	5339171	DIODE 1SS130
D 917	5339171	DIODE 1SS130
D 918	5339171	DIODE 1SS130
D 919	5339171	DIODE 1SS130
D 920	5339131	DIODE 1SS254
D 921	5339131	DIODE 1SS254
D1405	5339131	DIODE 1SS254
D1408	5339131	DIODE 1SS254
D1409	5339131	DIODE 1SS254
D1501	5339131	DIODE 1SS254
D1503	5339131	DIODE 1SS254

SYMBOL-No	P-No	DESCRIPTION
D1505	5339131	DIODE 1SS254
D1506	5339131	DIODE 1SS254
D1508	5339131	DIODE 1SS254
D1510	5339131	DIODE 1SS254
D2501	5339131	DIODE 1SS254
D2502	5339131	DIODE 1SS254
D2503	5339131	DIODE 1SS254
IC 101	1341901	IC SDA5642 [FOR ONLY545E/546E]
IC 141	5391282	IC DN6851
IC 201	5388552	MODULE HT4907P
IC 202	5362262	MODULE IC MSM6965
IC 203	1341701	IC NJM2228D
IC 301	1387975	PWB ASSY CHROMA PROCESS(HES8454C)
IC 351	5366641	IC BA7025L
IC 401	1341471	IC LA7295
IC 601	1341851	IC HD49726N
IC 602	5300821	IC M54874P
IC 603	5355582	IC HA13403
IC 604	5369181	IC M5218L
IC 605	1387231	MODULE BX7506
IC 701	5302384	IC M50957-662SP
IC 702	5301421	IC CXK1013P
IC 703	5361942	IC S-8053ALB
IC 801	5367201	IC UPC1484CA
IC 802	5364602	M5278L56
IC 803	5367221	IC BA6993
IC 851	5300452	IC STK5372H
IC 852	1341651	IC M5279L06
IC 901	5302621	IC HD614088SC50
IC 902	5300794	IC BA6209U4
IC 903	1387951	PWB ASSY TAPE END DET(BX7552)
IC 904	5721941	IC PROTECTOR
IC1401	5301254	IC M50455-003SP
IC1402	1340021	IC NJM2229S
IC1502	1342031	IC NJM2248
IC1503	5369431	IC LA7016
IC2503	5366981	IC M5201L
Q 141	5324661	TRANSISTOR PT-483F1
Q 142	5324661	TRANSISTOR PT-483F1
Q 201	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 202	1320012	TRANSISTOR 2SA933(S,R)
Q 205	1320012	TRANSISTOR 2SA933(S,R)
Q 206	1320012	TRANSISTOR 2SA933(S,R)
Q 207	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 208	5327062	TRANSISTOR 2SC1740S
Q 209	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 301	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 303	1320012	TRANSISTOR 2SA933(S,R)
Q 401	5327101	TRANSISTER 2SC3553BC
Q 402	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 403	53227323	TRANSISTOR 2SA952
Q 604	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 606	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 607	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 610	5323323	TRANSISTOR 2SD1251-PO
Q 615	53205933	TRANSISTOR 2SA673
Q 620	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 621	5323462	TRANSISTOR 2SD1266A-P
Q 622	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 623	5327031	TRANSISTOR 2SA673C
Q 801	5327021	TRANSISTOR 2SA844CD-TB
Q 803	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q 804	5323421	TRANSISTOR 2SD1276
Q 851	5322216	TRANSISTOR 2SC1741QR
Q 901	5327091	TRANSISTER 2SD1504E
Q 902	5327031	TRANSISTOR 2SA673C
QR 201	5327071	TRANSISTOR DTC124ES
QR 202	5327071	TRANSISTOR DTC124ES
QR 203	5323961	TRANSISTOR DTC124ES
QR 204	5327071	TRANSISTOR DTC124ES
QR 205	5327071	TRANSISTOR DTC124ES
QR 206	5327071	TRANSISTOR DTC124ES
QR 207	5327073	TRANSISTOR DTC144ES
QR 210	5327073	TRANSISTOR DTC144ES
QR 301	5327071	TRANSISTOR DTC124ES
QR 302	53235634	TRANSISTOR DTC144F
QR 411	5327081	TRANSISTOR RT1N241S
QR 412	5327081	TRANSISTOR RT1N241S
QR 413	5324091	TRANSISTOR RT1N241S
QR 601	5327082	TRANSISTOR RT1N441S

SYMBOL-No	P-No	DESCRIPTION
QR 602	5327082	TRANSISTOR RT1N441S
QR 603	5327082	TRANSISTOR RT1N441S
QR 605	5327082	TRANSISTOR RT1N441S
QR 608	5327082	TRANSISTOR RT1N441S
QR 609	5327082	TRANSISTOR RT1N441S
QR 612	5327082	TRANSISTOR RT1N441S
QR 613	5327082	TRANSISTOR RT1N441S
QR 614	5327082	TRANSISTOR RT1N441S
QR 901	5327073	TRANSISTOR DTC144ES
QR 902	5327073	TRANSISTOR DTC144ES
QR1501	5327074	TRANSISTOR DTA144ES-T
QR1502	5327073	TRANSISTOR DTC144ES
QR1595	5327073	TRANSISTOR DTC144ES
QR2501	5327082	TRANSISTOR RT1N441S
Q1401	5324631	TRANSISTOR 2SA1390C
Q1402	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q1403	5321292	TRANSISTOR 2SC1740S
Q1510	5327062	TRANSISTOR 2SC1740S
Q1404	5327071	TRANSISTOR DTC124ES
Q1530	1320012	TRANSISTOR 2SA933(S,R)
Q1532	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q1580	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q1581	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q1595	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
Q1596	5327062	TRANSISTOR 2SC1740SR(2SC1740S,R)
ZD 601	5339274	DIODE HZS15-3
ZD 701	5339265	DIODE HZS9-B3
ZD 702	5339151	DIODE RD2.7E-B2
ZD 801	5339257	DIODE HZ4B1
ZD 802	5339256	DIODE HZ30-1
ZD 803	5339252	DIODE HZS5-2CT
ZD 804	5339252	DIODE HZS5-2CT
ZD 851	5330312	DIODE HZ7B SI ZENER 1MHZ 0.4W
ZD 852	5330312	DIODE HZ7B SI ZENER 1MHZ 0.4W
ZD 901	5339271	DIODE HZS9A2
ZD 902	5339256	DIODE HZS30
ZD 903	5339262	DIODE HZS6-C2
ZD 904	5339262	DIODE HZS6-C2

TRANSFORMERS

T 401	5262532	BIAS COIL

COILS

L 202	5159077	CHOKE COIL 100UH+-10%
L 204	5159077	CHOKE COIL 100UH+-10%
L 205	5159077	CHOKE COIL 100UH+-10%
L 206	5121175	COIL 22UH
L 207	5159077	CHOKE COIL 100UH+-10%
L 208	5159079	CHOKE COIL 150UF+-10%
L 209	5121177	CHOKE COIL 33UH
L 210	5121178	CHOKE COIL 39UH
L 211	5152336	CHOKE COIL 68UH
L 215	5153037	CHOKE COIL 33UH
L 217	5152324	CHOKE COIL 10UH
L 302	5159082	CHOKE COIL 220UH
L 303	5159077	CHOKE COIL 100UH+-10%
L 304	5159077	CHOKE COIL 100UH+-10%
L 305	5159077	CHOKE COIL 100UH+-10%
L 306	5121173	COIL 15UH
L 307	5159084	CHOKE COIL 330UH
L 308	5159115	COIL 2200UH
L 309	5121179	CHOKE COIL 47UH
L 312	5153038	CHOKE COIL 39UH+-10%
L 351	5130431	COIL
L 352	5159077	CHOKE COIL 100UH+-10%
L 401	5159113	CHOKE COIL 8200UH
L 402	5159081	CHOKE COIL 180UH+-10%

SYMBOL-No	P-No	DESCRIPTION
L 403	5159111	CHOKE COIL 5600UH
L 404	5159081	CHOKE COIL 820UH+-10%
L 405	5159115	CHOKE COIL 2200UF+-1%
L 406	5152349	CHOKE COIL 180UF+-10%
L 851	5273341	LINE FILTER
L 901	5159077	CHOKE COIL 100UH+-10%
L 902	51590773	CHOKE COIL 100UH+-10%
L1401	5159077	CHOKE COIL 100UH+-10%
L1402	5159077	CHOKE COIL 100UH+-10%
L1403	5159089	CHOKE COIL 820UH+-10%
L1404	5159071	CHOKE COIL 33UH+-10%
L1405	5152333	CHOKE COIL 47UH+-10%
L1406	5159071	CHOKE COIL 33UH+-10%
L1501	5152337	CHOKE COIL 100UH+-10%
L1502	5152337	CHOKE COIL 100UH+-10%
L1520	5152331	CHOKE COIL 33UH+-10%
L1530	5152337	CHOKE COIL 100UH+-10%
L1530	5152337	CHOKE COIL 100UH+-10%
L1591	5152337	CHOKE COIL 100UH+-10%
L2501	5152337	CHOKE COIL 100UH+-10%
L2502	5159154	CHOKE COIL 100UH
L2503	5152337	CHOKE COIL 100UH+-10%

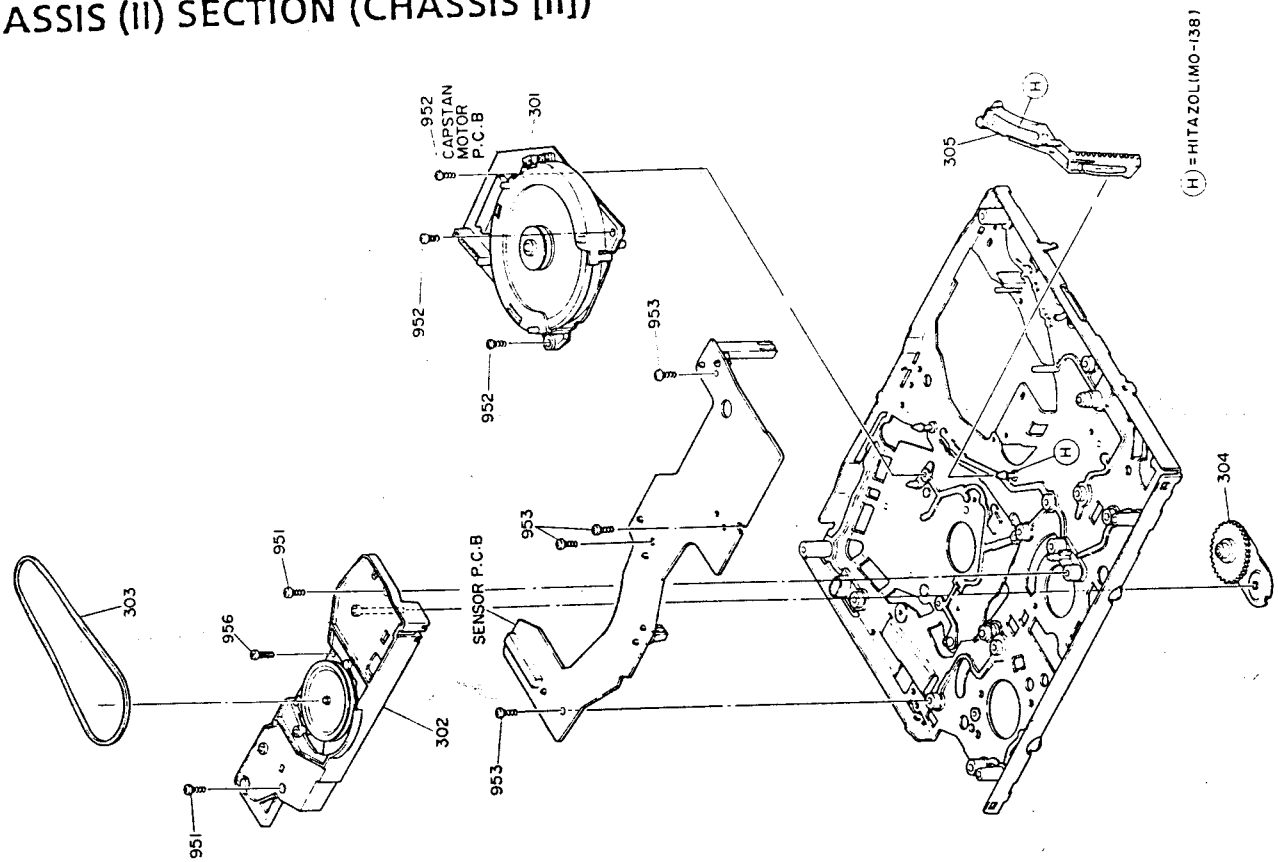
CRYSTALS

X 701	5781581	CRYSTAL
X 702	5783001	CRYSTAL
X1401	5780821	CRYSTAL 17.7MHZ
X1402	5781782	CRYSTAL 500KHZ

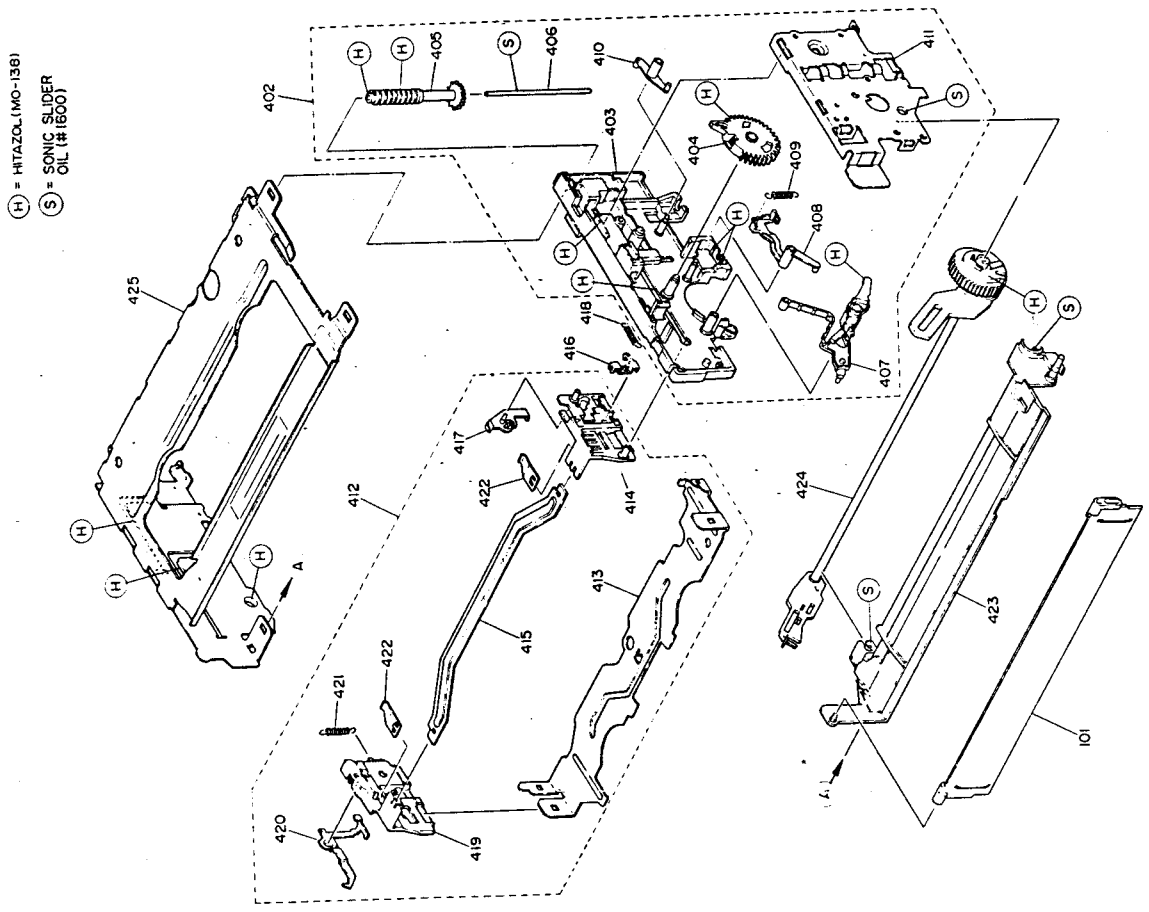
MISCELLANEOUS

BL2501	5272372	CORE
BL2502	5272372	CORE
BZ 701	5409272	BUZZER
CE 901	5781981	CRYSTAL 8.0MHZ
CP 201	5163684	LC FILTER
CP 202	5163685	LC FILTER
CP 204	5169003	LOW PASS FILTER
CP 205	5169012	LOW PASS FILTER
CP 301	5163791	LC FILTER
CP 302	5785388	DELAY LINE
CP 303	5163792	LC FILTER
CP 351	5160431	BAND PASS FILTER
DG 701	5315033	DISPLAY
⚠F 850	57201753	FUSE 0.8A
⚠F 851	57201774	FUSE 2A
⚠F 852	57210613	FUSE 1.6A
⚠F 853	5720171	FUSE 315MA
⚠F 854	5720171	FUSE 315MA
IR 701	5477541	MODULE GP1U521H
J2502	5672973	PLATE,JACK
S 141	5635321	SWITCH
S 142	5635331	SWITCH
S 703	5635061	SWITCH
S 704	5635061	SWITCH
S 705	5635061	SWITCH
S 709	5635061	SWITCH
S 710	5635061	SWITCH
S 711	5635061	SWITCH
S 712	5635061	SWITCH
S 713	5635061	SWITCH
S 714	5635061	SWITCH
S 715	5635061	SWITCH
S 716	5635061	SWITCH
S 717	5635061	SWITCH
S 718	5635061	SWITCH
S 719	5635061	SWITCH
S1501	5622562	SWITCH
S1504	5622562	SWITCH

CHASSIS (II) SECTION (CHASSIS [II])



CASSETTE LOADING MECHANISM SECTION (CASSETTEN-LADEMECHANISMUS)



MECH

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MECHANICAL PARTS LIST (MECHANISCHE STÜCKLISTE)

SYMBOL-No	P-No	DESCRIPTION	
		FOR FINAL ASSEMBLY	
101	6231128	DOOR,CASSETTE	
102	7741444	FELT (LEG)	
103	6003313	COVER,BOTTOM	
104	6004007	COVER,TOP	
105	6232381	PANEL,FRONT [FOR ONLY 540E]	
105	6232382	PANEL,FRONT [FOR ONLY 545E]	
105	6232391	PANEL,FRONT [FOR ONLY 546E]	
106	6073311	BUTTON,PE	
107	6232161	PANEL,REAR	
108	7418061	BRACKET,REAR	
109	7674014	CUSHION	
110	6800971	STUD	
111	7494525	PLATE,SHIELD	
112	6753911	FUSE COVER	
113	5885991	PLUG CABLE	
114	6794591	BUSHING	
⚠115	5850722	CORD	
116	7700872	SHEET,PROTECT	
117	67142164	NYLON RIVET	
⚠118	5214082	TRANSFORMER,POWER	
119	6229391	PIECE,REAR	
120	7425421	RB HEAT SINK	
121	5588071	TUNER IF BLOCK	
122	5589111	RF CONVERTER	
123	62322314	HOLDER,DISPLAY	
124	64072814	HOLDER,LED	
125	6869311	COVER	
126	5722214	FUSE HOLDER	
127	5722262	FUSE HOLDER	
128	5722252	FUSE HOLDER	
131	6182461	HOLDER,JACK	
202	6911101	SCREW	
203	7412852	BASE-ACE HEAD	
204	5446631	HEAD-AUDIO CONTROL	
205	6304906	SPRING	
206	6522752	SPRING	
207	7785673	NUT	
208	6896912	BRAKE	
209	6555501	SPRING	
210	6415532	REEL,SUPPLY	
211	7789123	POLYSLIDER WASHER	
212	6415542	REEL-TAKE UP	
213	7789122	POLYSLIDER WASHER	
214	6975761	PRESSER ROLLER	
215	6804273	BLOCK,SLIDER	
216	7412822	PLATE	
217	7412816	GEAR,LOADING (L)	
218	7412806	GEAR,LOADING (R)	
219	6975743	GUIDE ROLLER BASE	(IN)
220	6344741	GUIDE ROLLER	
221	6975732	GUIDE ROLLER BASE	(OUT)
222	6911001	BASE,CYLINDER	
223	5445851	HEAD FULL ERASE	
224	6897473	ARM,IMPEDANCE	
225	4508237	GUIDE,TAPE	
226	6555431	SPRING	
227	7413665	HOLDER-BAND	
228	7412863	ARM	
229	6555444	SPRING	
230	6897264	HOLDER	
231	6896751	ARM	
232	6555061	SPRING	
233	4508235	GUIDE	
235	7429672	BRACKET	
236	7398631	BRACKET	
237	7412881	ARM	
238	6976551	ARM	
239	7412892	ARM	
240	7428072	ARM,OPERATION	
241	6896902	BRAKE	
242	6551151	SPRING	
243	6804791	ARM	
244	6896894	HOLDER,MOTOR	
245	6896852	ARM	
246	6897251	ARM	
247	6555483	SPRING	
248	6897271	ARM	
249	6897065	GEAR,MODE	
250	6434861	WORM WHEEL	
251	6555052	SPRING	
252	7799012	WASHER	
253	6976371	ARM	
254	77866233	POLYSLIDER WASHER	
255	6898472	ARM,IDLE	
261	1388261	PWB ASSY PRE AMP	
271	7415782	BRACKET	
272	7415793	BRACKET	
301	5571452	MOTOR,CAPSTAN	
302	6896951	CULUTCH BASE ASSY	
303	6351554	BELT	
304	6897095	ARM,FF/REW	
305	6434851	RACK	
402	7412574	BRACKET,SIDE(R)	
403	6896685	BRACKET,SIDE(R)	
404	6896971	WORM WHEEL ASSY	
405	6435571	WORM	
406	4508221	WORM SHAFT	
407	6896632	ARM-SWITCH	
408	6897041	ARM-SWITCH	
409	6302474	SPRING	
410	6896623	ARM,DOOR	
411	7412583	BRACKET-GEAR	
412	7412562	HOLDER,CASSETTE	
413	7412595	HOLDER BASE,CASSETTE	
414	6896664	HOLDER,CASSETTE (R)	
415	7428113	HOLDER,STAY	
416	6897531	ARM	
417	6897001	ARM	
418	6555043	SPRING	
419	6896673	HOLDER,CASSETTE (L)	
420	7412944	ARM	
421	6555771	SPRING	
422	7412952	SPRING	
423	6896653	HOLDER-FRONT	
424	7580791	SHAFT ASSY	
425	7412551	BRACKET-SIDE (L)	
501	5436103	CYLINDER,UPPER	
502	5436048	CYLINDER,LOWER	
503	5792633	BRUSH	
901	86994123	SCREW (3X12)	BLACK
902	7784428	SCREW (M3)	
903	8699410	SCREW (3X14)	BLACK
904	86914083	SCREW (3X8)	
905	86914143	SCREW	
906	7785351	SCREW (4X14)	
951	86914103	SCREW	
952	86913103	SCREW	
953	86994083	SCREW	
954	7781872	SCREW-3MMDX8MM	
955	7773086	SCREW	
956	8741414	SCREW (3X14)	
958	8691408	SCREW (3X8)	
959	87414083	SCREW (B3X8)	
960	8741412	SCREW (B3X12)	
961	7785941	SCREW	
962	87114043	SCREW - 3X4 PAN HEAD SCREW	
		FOR ACCESSARIES	
	5898876	CONNECTER CORD	
	5618793	REMOTE CONTROL BOX	
		FOR REMOTE CONTROLLER UNIT	
1	5614061	COVER	
2	5614074	UPPER CASE	
3	5614062	CLEAR PLATE	
4	5614063	BOTTOM CASE	
5	5614066	BATTERY LID	
6	5614086	IC	

HITACHI
SERVICE MANUAL

TK | No.2775E

VT-540E SERIES

Technical Information

CONTENTS

1. DOUBLE AZIMUTH 4 HEAD SYSTEM

1-1 Outline 3
1-2 Recording Circuit.....3
1-3 Preamplifier.....5
1-4 Switching Signal Generator...6
1-5 Signal Path of Control Signal.....8

This Technical Information manual describes the double azimuth 4 head system. See the VT-420E and VT-520E Technical information manuals (No. 2621E/2622G 2771E/2834G) for the items not included in this manual.

VHS
THIS VIDEO DECK IS A VHS TYPE VIDEO RECORDER.
FOR PROPER OPERATION, ONLY THE VHS TYPE CASSETTE MUST BE USED.

Manuals related to the VT-540E series

Name of Manual	Language	Manual No.	Chapters included
Technical Data	English	2759E	Chapter 1-6
	German	2865G	Chapter 1-6
Technical Information	English	2775E	---
	German	2866G	---

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

October 1988 TOKAI WORKS

COMPARISON WITH PREVIOUS MODEL

	ITEM	VT-540E	VT-520E/530E
FEATURES	HQ (HIGH QUALITY)	USED	*
	RECORD/PLAYBACK SPEED	SP/LP	SP
	TRICK PLAY	2-SPEED VISUAL SEARCH, FINE STILL, F.ADV, VARIABLE FINE SLOW	*(excepts VT-520E)
	AUTOMATIC CONTROL FUNCTION	PLAY, REPEAT, REWIND, REWIND SHUT OFF, OPERATE ON/OFF, EJECT ENDLESS PLAY, INDEX DATE RECORDING, DIMMER	*
	NOISE LOCK SEARCH FUNCTION	YES	*
	WIRELESS REMOTE CONTROLLER	DISPLAYS TIME & DATE	*
	TIMER RECORDING PROGRAMMES	8 PROGRAMMES/1 YEAR	*
	TIMER BACKUP TIME TIMER PROGRAMMED TIME DISPLAY	ABOUT 60 MINUTES START AND STOP SIMULTANIOUSLY	*
	IRT	CAN SET START AND LENGTH	*
	TAPE COUNTER INDICATOR	INDEPENDENT	*
	MEMORY STOP OPERATION MODES	REWIND AND F.FWD	*
	CHANNEL TUNING FUNCTIONS	VOLTAGE SYNTHESIZER FREQUENCY SYNTHESIZER	* *
	EDIT SWITCH	YES	*
	PLAYBACK PICTURE CONTROL	HIGH FREQUENCY CONTROL	*
	ONE-BUTTON RECORDING	YES	*
	SLOW TRACKING	YES (by REMOTE)	*
CHASSIS	BASIC CHASSIS TYPE	PZ	*
	CYLINDER MOTOR	THREE-PHASE OUTER ROTOR FG: 300Hz	*
	VIDEO HEADS	4 HEADS SP CH-1/CH-2: 48 µm LP CH-1/CH-2: 30 µm CONNECTOR TYPE	3 HEADS(for 530E) CH-1/CH-2: 57 µm CH-3: 57µm 2 HEADS(for 520E) CH-1/CH-2: 57 µm CONNECTOR TYPE
	HEATER	NONE (HEAT SINK USED)	*
	DEW SENSOR	NO	*

	ITEM		VT-540E	VT-520E/530EE
MAIN CONTROL ICs	VIDEO SYSTEM SYSTEM	Y.SIGNAL PROCESS	HT4907P(IC201)	HT4907C(IC201)
		CHROMA SIGNAL PROCESS	HES8454C(IC301)	*
		SECAM DETECTOR	BA7025L (IC351)	*(CT,VPS,DS)
		PRE/REC AMP	BA7254S (IC001)	BA7212S(IC001:520E) BA7253S(IC001:530E)
		IH DELAY	MSM6965P(IC202)	*
	ON SCREEN DISPLAY	CHARACTER GEN SYNC SEPARATOR	M50455-003SP(IC1401) NJM2229S(IC1402)	*
	AUDIO SYSTEM	REC/PB AMP	LA7295(IC401)	*
	JACK	AUDIO INPUT SWITCH VIDEO INPUT SWITCH /CHRACTER ADDER	M5201L(IC2503) NJM2248(IC1502)	*
	SERVO SYSTEM	SPEED/PHASE CONTROL	HD49726(IC601)	*
		CYLINDER MOTOR DRIVE	HA13403 (IC603)	*
		CAPSTAN MOTOR DRIVE	SA2006A(IC01)	*
		TRICKPLAY CONTROL	M54874P (IC602)	*
	SYSTEM CONTROL	SYSTEM CONTROL μP	HD614088SC50 (IC901)	*
		LOADING MOTOR DRIVE	BA6209 (IC902)	*
	TIMER	TIMER μP	M50957-662SP(IC701)CT M50957-663SP(IC701)UK	* *
		EAROM	CSK1013P(IC702)	*
	CH-TUNING SYSTEM	TUNING CONTROL	μPC1484CA (IC801,F.S) LA7935(IC801 V.S UK)	* *
	POWER SUPPLY	REGULATOR	STK5372H (IC851)	*
	VPS(for VPS)	VPS SLICER	SDA5642(IC101)	*

* means that the contents are the same as listed in the left column.

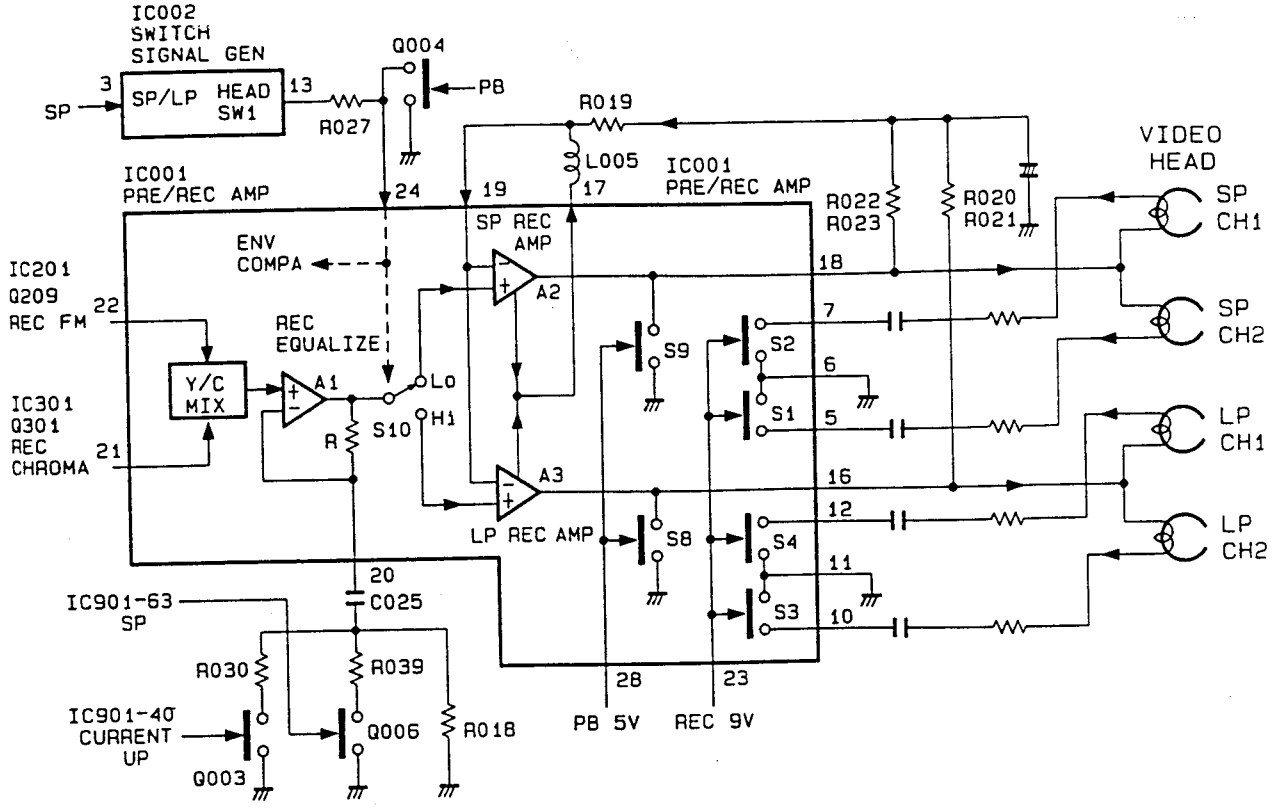

Fig. 1-3 Recording Circuit on Preamp P.C.B.

1-3 Preamplifier

Fig. 1-4 shows the preamplifier of the unit.
The SP channel-2 video head picks up the weak FM luminance signal and 627kHz chrominance signal while it is in contact with the video track in the playback mode and supplies them to amp A1 through pin 5 (0.3 mVp-p) of IC001. The components connected to pin 4 form the negative feedback network of amp A1.

Switches S5 and S6 in the subsequent stage are changed over by the SW25Hz signal applied through pin 3 to produce a continuous SP PB signal and a continuous LP PB playback signal. The outputs of S5 and S6 are applied to the SP/LP playback signal select switch, S7.
S7 is switched by the voltage level applied to pin 14; when pin 14 is "Lo", it selects the SP playback signal, and when pin 14 is "Hi", it selects the PB signal picked up by the LP heads.

The frequency response of the peaking amp in the subsequent stage depends on the frequency response of the load connected to pin 30. As no component is connected to pin 30 in this unit, the peaking amp works as a normal flat amp.

The gain of the AGC stage is regulated by the control voltage at pin 2 detected by the AGC detector. The AGC stage eliminates variations in the amplitude of the PB signals picked up by each head and outputs a luminance FM playback signal with a fixed amplitude to the FM phase equalizer.

The FM phase equalizer A6 corrects the phase distortion occurring in the peaking amp in advance. The bandpass filter in the next stage passes the luminance FM components and eliminates the 627kHz chrominance and higher sideband components. The buffer amp Q001 supplies the approx. 0.3Vp-p PB FM signal to the Y/Chroma circuit board. The chroma amp stage in IC001 supplies the approx. 0.3 Vp-p PB FM signal (including the PB 627kHz chrominance signal) to the Y/Chroma circuit board through pin 29.

The SP envelope detector in IC001 rectifies the output of head switch S5 to detect the envelope of SP FM signal and applies it to the positive input of envelope comparator A5. Capacitor C019 connected to pin 26 smooths the detected envelope. The LP envelope detector detects the envelope of the LP FM signal and applies it to the negative input of the envelope comparator.

As Q004 turns on during play, pin 24 is grounded and the envelope comparator A5 becomes active. The envelope comparator compares the SP and LP envelopes, and when the SP envelope is larger than the LP envelope, it outputs logic high at pin 27. When the LP envelope is larger than

the SP envelope, the envelope detector outputs logic low. The output of the envelope detector is supplied to pin 6 COMP of switching signal generator IC002 through inverter Q005 and is used to produce a switching signal that will be used to form a picture with less noise in the SP search mode.

D-FF in IC002 latches logic level applied to the D input and outputs it at the Q output. In the SP search mode, logic high is applied to pins 1 - 3 of IC002, and switch S1 selects the Q output of FF1. Doing this, pin 13 HEAD SW1 of IC002 outputs logic low when the SP FM envelope is larger than the LP FM envelope and applies it to S7 in IC001 so S7 selects the SP FM envelope. In the SP search mode, S7 selects the SP playback signal when the SP FM envelope is larger than the LP FM envelope, and S7 selects the playback signal picked up by the LP heads when the LP FM envelope is larger than the SP FM envelope.

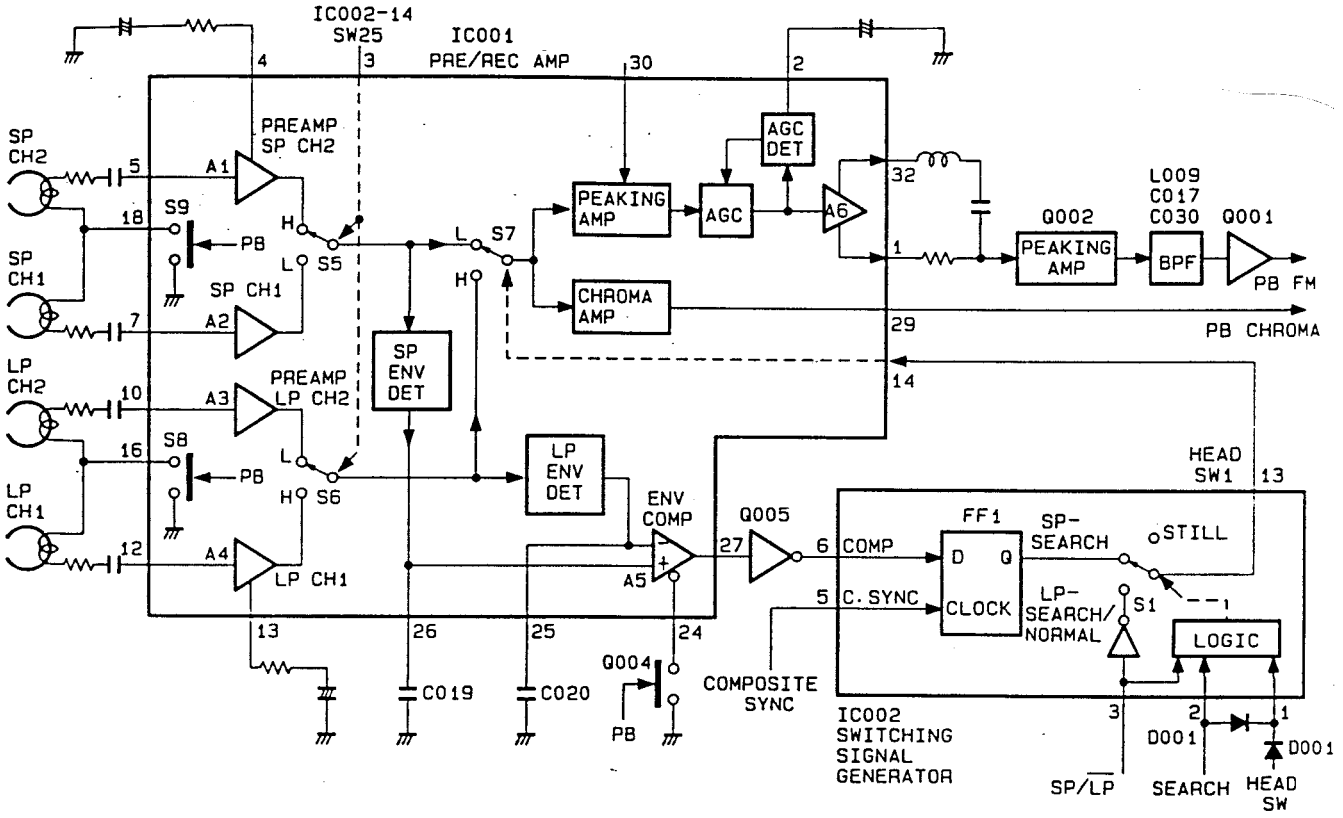

Fig. 1-4 Preamplifier

1-4 Switching Signal Generator

This unit has 4 video heads, and the heads shown in Fig. 1-2 are selected in different modes to record and play back video signals with the best quality. The switching signal generator IC002 produces switching signals to select the required head(s) at any given instant in different modes.

Fig. 1-5 shows the switching signal generator and Table 1-1 shows the switching signals output from IC002. Pin 14 HEAD SW2 outputs head switching signal SW25 to select the CH-1 or CH-2 signals. The phase of the SW25 signal at pin 14 is the same as that of the SW25 signal which is produced by servo processing IC601 and is input to pin 4. CHROMA 25Hz at pin 15 is supplied to chrominance signal processor IC301 and is used to shift the phase of chrominance signal. HEAD SW1 at pin 13 is used to select the SP or LP heads. As pin 13 outputs "Lo" in the record mode when the tape speed is SP (pin 3: Hi), S10 in IC001 selects the SP position and the recording current flows to the SP heads. Since pin 13 outputs "Lo" during playback when the tape speed is SP (pin 3: Hi, pins 1/2: Lo), S7 in IC001 selects the SP position and the playback signal picked up by the SP heads is output to the next stage.

Pin 13 outputs a $\overline{\text{SW25Hz}}$ signal in the SP still mode (pins 1/2/3: Hi/Lo/Hi). Therefore, when the original SW25Hz signal at pin 4 is "Lo", the playback signal picked up by the LP CH-2 head is selected by switches S5 - S7, and when the original SW25Hz signal is "Hi", the SP CH-2 head output is selected. In this way, one field of the video signal on the negative-azimuth video track is played back in the SP still mode.

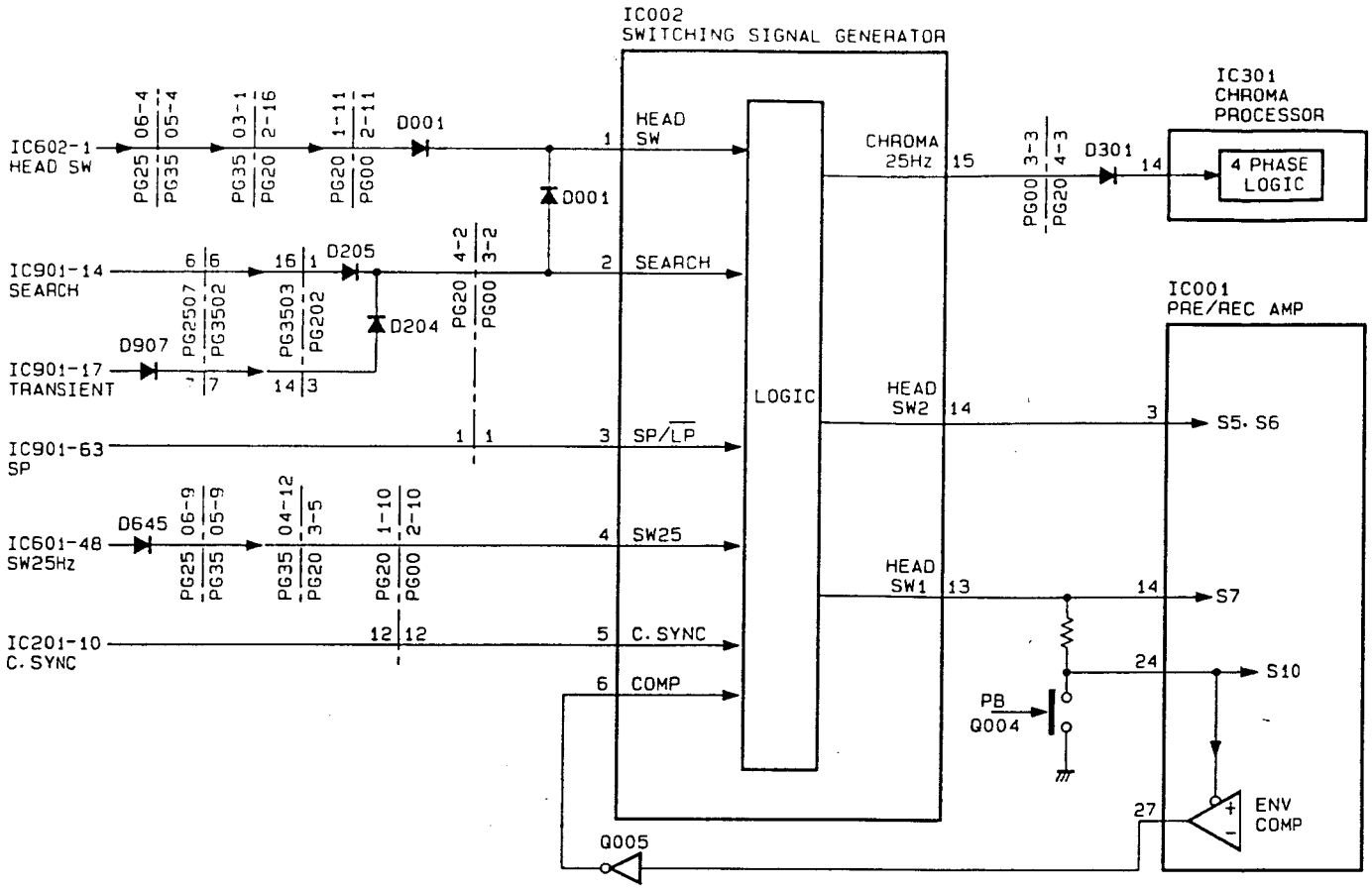

Fig. 1-5 Switching Signal Generator

Table 1-1 Switching Signals

INPUT			OUTPUT		
TAPE SPEED Pin 3	MODE Pin 1 / Pin 2	COMP Pin 6	HEAD SW1 Pin 13	CHROMA 25Hz Pin 15	HEAD SW2 Pin 14
SP Hi	NORMAL: Lo / Lo	-	Lo	SW25	SW25
	STILL: Hi / Lo	-	$\overline{SW25}$	Hi	SW25
	SEARCH: Hi / Hi	Hi	Hi	$\overline{SW25}$	SW25
		Lo	Lo	SW25	SW25
LP Lo	NORMAL: Lo / Lo	-	Hi	$\overline{SW25}$	SW25
	STILL: Hi / Lo	-	SW25	Lo	SW25
	SEARCH: Hi / Hi	-	Hi	$\overline{SW25}$	SW25

When the negative-azimuth (CH-2) track is played back, the phase of the chrominance signal must be shifted 90° for every H (horizontal sync.) according to the VHS standards. In the SP still mode, pin 15 outputs "Hi" to chrominance processor IC301 to shift the phase of the chrominance signal. In the slow mode, to select appropriate heads, trick play processor IC602 outputs a negative pulse HEAD SW with a specified period to pin 1 of IC002. In the slow play mode, when pin 1 is "Lo", the same combination of the heads selected in the SP mode are selected, and when pin 1 is "Hi", the same combination of the heads selected in the still play is selected.

In the SP search mode, when the SP FM envelope is larger than the LP FM envelope, IC002 receives "Lo" at pin 6 and pin 13 outputs "Lo", causing S7 to select the playback signal picked up by the SP heads as described in the previous item. On the contrary, when the LP envelope is larger than the SP envelope, IC002 receives "Hi" at pin 6 and pin 13 outputs "Hi", causing S7 to select the plaback signal picked up by the LP heads.

The track of the video heads comes off the video tracks for a short period immediately after the operation mode is changed (from play to still and vice versa, slow to play, etc.). The system control μP IC901 outputs "Hi" at pin 17 TRANSIENT at this time so the preamplifier selects a video signal with less noise. The output at pin 17 TRANSIENT is applied to pin 2 of IC002, causing IC002 to enter the search mode, and preamplifier IC001 selects a signal from the heads with the higher output and outputs it.

1-5 Signal Path of Control Signal

In the conventional VTR, the CTL signal is recorded on the control track immediately after the recording by channel-2 video heads has started and the X value, the distance between the end of a channel-2 video track and the corresponding CTL signal, is nominally 79.244 cm. When this unit operates at the LP speed and the CTL signal is recorded, as the channel-2 LP video head is placed very close to the channel-1 SP video head as illustrated in Fig. 1-1, the CTL signal is recorded immediately after the recording by the channel-1 LP video head has started. If the position of the CTL head is the same as the conventional position, the X-value will be short by 0.234 mm. (LP speed x vertical period = 11.7 mm/s x 20 ms = 0.234 mm)

To make the X-value produced in the LP recording normal, the position of the CTL head of the unit is changed to a position 0.234 mm further from the conventional position. In this unit the CTL head position of which is displaced by 0.234 mm, to record the CTL signal at the specified position in the SP speed mode, the CTL recording signal is delayed by 10 ms. In the SP playback mode the phase of the CTL signal is delayed by 10 ms due to the displacement of the head position. Since the playback CTL signal is used as the sampling pulse of the capstan phase control, the reference signal for the capstan phase control must be delayed by the same value to operate the servo system normally.

Fig. 1-6 shows the route of the CTL signal. In the record mode, the vertical sync. separator stage in servo IC601 receives a composite sync. signal at pin 58 and removes the horizontal sync. signal and divides the 50 Hz vertical sync. to 25Hz. The 25 Hz vertical sync. is passed through record/playback switch S6 and arrives the delay monostable multivibrator. The delay time at the delay MM depends on the time constant attached to pin 59. Thus, as QR603 turns on in the SP mode, the delay time is 10 ms for the SP mode and is 0 ms for the LP mode. The delayed 25 Hz vertical sync. is supplied to the CTL recording amp and duty switch stage, where the recording CTL signal or index signal is produced. The recording CTL signal is produced when pin 49 is logic low and its duty ratio is 60%. The recording index signal is produced when pin 49 is logic high and its duty ratio is 27.5%. The recording CTL (or index) signal is applied to the CTL head via mute switches S4, S5 and pins 16, 17.(4V p-p)

In the playback mode, the CTL head picks up the playback CTL pulse (or index signal: 5 mVp-p) and sends it to pin 27 of servo IC601 via the CTL amp in IC602. The CTL playback amp A2 amplifies the playback CTL signal and the CTL AGC stage keeps the output level constant regardless input level variations and sends the playback CTL signal to the CTL shaper stage and the capstan phase error detector stage.

In this unit, as the SP playback CTL signal is delayed by 10 ms because of the displacement of the CTL head, to assure normal operation of the capstan phase control, the reference signal REF 25Hz must be delayed by 10 ms. The REF 25Hz is produced by dividing the 4.43MHz carrier signal applied to pin 8 and then applied to the tracking monostable multivibrator; the phase of the reference signal is regulated by the tracking control circuit attached at pin 60. The REF 25Hz is then passed S6 and is applied to the delay monostable multivibrator stage. In the SP mode, as C696 is shorted to ground via QR603, the delay MM applies additional 10 ms delay to the REF 25Hz and sends the REF 25Hz to the capstan phase error detector stage via switch S1. Thus the relative phase between the playback CTL and REF 25Hz in the unit is the same as that of conventional VTR.

The CTL shaper stage shapes the playback CTL signal into a square wave whose polarity and duty cycle are reverse to those of the recorded CTL signal and then outputs a square 4 Vp-p playback CTL signal to the CTL/index discriminator via pins 10 and 52. The CTL/index discriminator outputs logic high to the system control μP via pin 37 to activate the index function, if the duty ratio of the input signal is 72.5(100-27.5)% . If the input is a CTL signal and the duty ratio of the input signal is 40%, the CTL/index stage outputs logic low.

The previous servo IC was provided with a PLL H. sync generator and output an artificial horizontal sync signal via pin 52. The servo IC HD49726 used in this unit is not provided with the PLL H. sync generator and pin 52 is used as the input of the CTL/index discriminator.

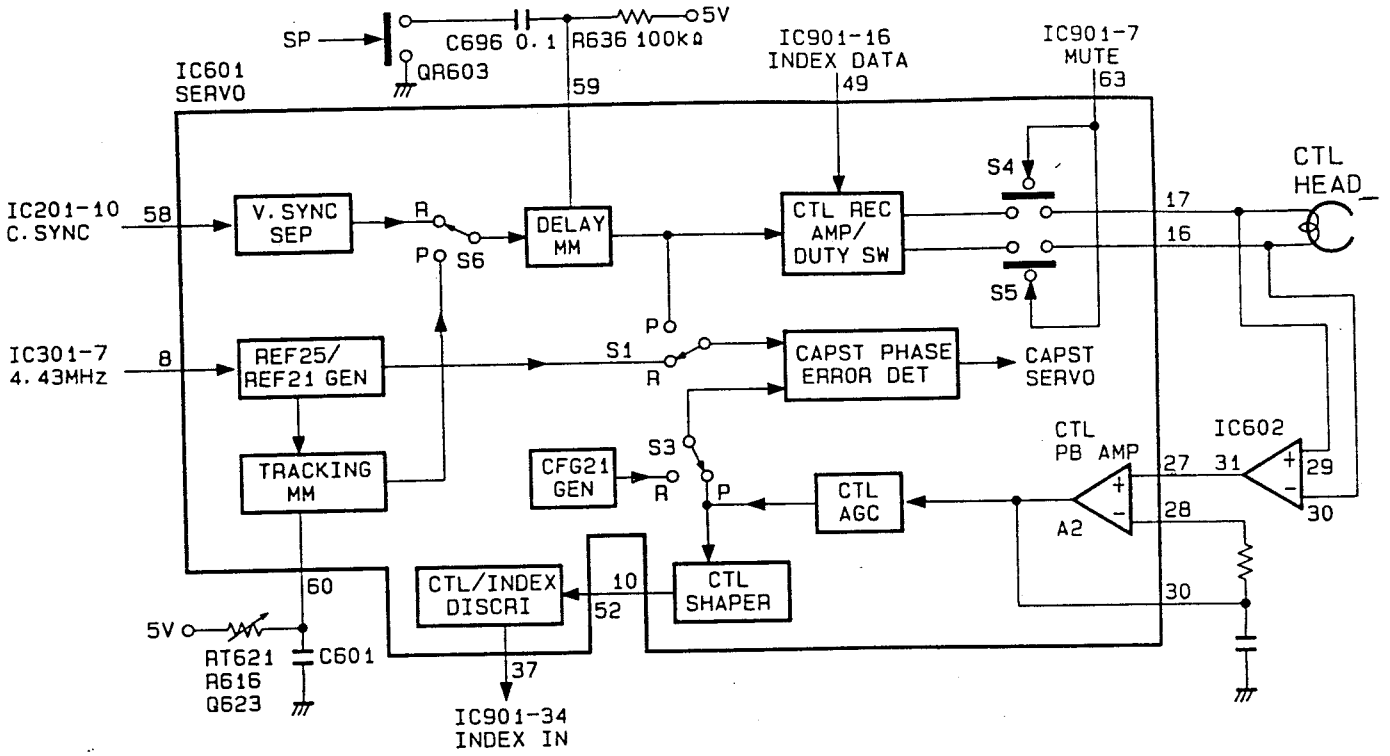

Fig. 1-6 Signal Path of Control Signal